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THE TONIC TREATMENT OF

EPILEPSY

—
TYRRELL

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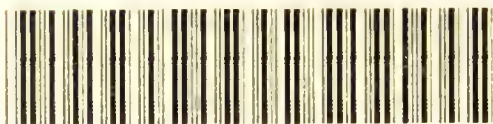
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THE TONIC TREATMENT

OF

EPILEPSY

AND

KINDRED NERVOUS AFFECTIONS.

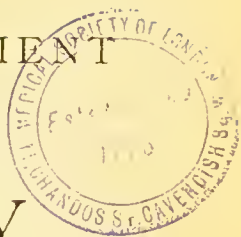
BY

WALTER TYRRELL, M.R.C.S.

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PREFACE.
TO
FIFTH EDITION.

To profess a disbelief in an established method of treatment of disease is a bold and somewhat thankless office, more especially when the method attacked is one which has been so universally adopted, and so widely practised, as the Bromide treatment of Epilepsy.

Still, in firing this my fifth shot against the now failing fortress, I am pleased to note a marked result of my assaults. There is a certain want of faith arising in the method of treatment which was at first vaunted with so much confidence.

A wider experience is proving that the use of Bromides produces merely temporary and palliative results, and that the only plan by which it is possible to effect permanent cure is by restoring to the nervous constitution that power of control, the loss of which constitutes the disease.

WALTER TYRRELL.

2, ALBERT MANSIONS,
VICTORIA STREET, S.W.,
AND
CLAREMONT, GREAT MALVERN,
August 1887.



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EPILEPSY.

CHAPTER I.

THERE is probably no disease which offers greater or more serious obstacles to the formation of a correct diagnosis than Epilepsy: its seat of origin and its causation are equally obscure; purely paroxysmal in its nature, the intervals of attack are often periods during which the patient enjoys his usual health marked by no signs of disorder or derangement; and after death the pathologist often looks in vain for any positive structural changes in the brain or spinal cord which would account for seizures so terrible in their nature. It has been said, indeed, that Epilepsy is a disease which has no morbid anatomy; and this is probably true, so far at least as the earlier stages of the disease are concerned; for in all likelihood the immediate cause of the epileptic seizure lies not in any structural change in any part of the nervous system, but in some statical alteration, possibly some change in the

electrical condition of the ganglionic cells, which form, as it were, the seat of government of the cerebral control. Any traces of alteration or destruction of tissue found after death, such as those discovered by Professor Van der Kolk to exist in the medullæ oblongatæ of old-standing epileptics are, I believe, results of long-continued and frequently-repeated paroxysms, not causes of them; though it is highly probable that these lesions, when once established, do to some considerable extent lessen the power of resistance to the on-coming of the attack, and, indeed, so far act as irritants as to keep up the habit of Epilepsy. Science, then, in its present state of advancement, being able to tell us nothing positive concerning the conditions which give rise to so grave a malady—the physiologist and the pathologist being equally at fault, and able to do little more than propound vague theories—it remains for those who are brought much into contact with this class of disease, and who have large opportunities for clinical observation, not only during the actual period of attack, but also in the intervals, when to an ordinary observer no ailment whatever might be supposed to exist, it remains for these to endeavour to determine whether any, and if any, what conditions are present in such persons which may account for the occurrence of the disease. Under these circumstances it is well to start any investigation from a position or point the truth of which is clearly

ascertained and beyond question. Now, it is clear that the actual epileptic seizure is due to the sudden discharge or escape of an accumulation of nerve force from some point situate within the cranial cavity, though the exact spot from which it takes its departure, and the precise method of its liberation are still moot points. This abnormal escape, or explosion, as it may be termed, of nerve force takes place with more or less suddenness, and when the action is delayed, the more severe symptoms are usually heralded by nervous sensations of various kinds and of different degrees of intensity. These warnings, or *auræ*, as they are termed, may be either motor, or sensory, or a combination of both, or psychical; but more often they are motor only. They vary much in their strength and direction, and are frequently incomplete, that is to say, they pass off without the occurrence of the graver phenomena of an actual attack. It has been said that these motor *auræ* commence invariably in the smaller muscles, such as are engaged in the performance of more special actions, and gradually spread to those larger muscles which fulfil general actions: thus these premonitory spasms often commence in the fingers or toes, and gradually travel upwards and invade the larger, and more important muscles. The reverse of this is observable with regard to the sensory *auræ*, as these originate in the general, and travel from thence to the special; thus, the first

symptom of a visual aura may be the perception of sparks of fire, or sudden darkness, or of a general red light pervading everything ; this will be followed by a distinct illusion or hallucination. Thus, a patient of mine saw first a general red glare over every object in the room ; this was followed, after a short interval, by the vision of a dog surrounded by rays of white light ; after this the actual epileptic seizure occurred immediately. In other cases the aura may consist of some derangement of one or other of the nerves of special sense, in the form, for instance, of an unpleasant smell in the nose ; in some cases this may precede the actual attack by as much as twenty-four hours. Gustatory auræ are much more rare. What may be termed visceral auræ, that is sensations proceeding from the pit of the stomach, are extremely common and are often accompanied by a sensation of sinking or faintness, and at times even of sickness. In some cases of Epilepsy these sensations would appear to be almost constantly present, and would certainly appear to be connected with the solar plexus. The frequency with which irritations of the stomach and intestines give rise to sudden epileptic or epileptiform seizures, points very clearly to the powerful influence which the sympathetic nervous system exercises on the convulsive centres.

With regard to the frequency with which auræ precede the epileptic attack, Dr. Gowers states that

in 1000 cases in which its presence or absence was noted, 505 felt these premonitory symptoms, which in 495 were unnoticed. If these statistics were sufficiently large to enable us to form a reliable opinion, it would appear that, in about one half of the cases, consciousness was retained sufficiently long to enable the patient to perceive the on-coming of the attack. In the other half, the paroxysm would occur instantaneously, the patient losing consciousness in a moment without the slightest warning. Although it is in many cases difficult, as I shall presently show, to distinguish simple Epilepsy from other kindred disorders—hysteria more especially—yet I think it may be taken as a rule that every case of pure Epilepsy is attended by complete unconsciousness. No doubt certain cases do at times come under notice, in which even this symptom may be simulated ; but they are, I think, not difficult to detect.

In describing Epilepsy I prefer to adopt the usual method of classification, and describe the disease under its two forms—convulsive and non-convulsive—(*le haut mal* and *le petit mal*). Convulsive Epilepsy may be complete or partial, that is to say, that the nerve force, when liberated from the discharging centres may find its way down all the motor tracts, thus producing a general convulsion, or, it may pass down one single efferent nerve, or a single group of nerves, and so produce a local or

partial convulsion. This will depend on the amount of resistance offered by the neighbouring centres, and perhaps also partially on the force of the discharging lesions. In the commencement of a convulsive seizure, it is usually seen that one side of the body is affected sooner than the other; very commonly the head is twisted over to one side. This circumstance may arise from several distinct causes; it may be due to the first throes of the convulsion, before the discharge has become bilateral; or it may be determined by the more powerful muscular state of the side principally affected. The phenomena which attend the commencement of an epileptic seizure succeed each other with perplexing rapidity; there is commonly a sudden pallor, succeeded by a flush; in many cases a cry, sometimes shrill, sometimes more like a deep bellow, caused by the sudden expulsion of air, from the violently contracted chest, through the spasmodically narrowed aperture of the glottis. This cry sometimes occurs so early in the series of symptoms that the patient is, in some cases, able, after the subsidence of the attack, to recall the memory of the sound which ushered it in.

The first changes of colour, which I have described, are, so soon as the tonic convulsion has become thoroughly established, changed to a deep congested flush, caused by the engorgement of the veins of the head and neck from obstruction of the venous

circulation by muscular pressure. The heart's action is now found to become very irregular and tumultuous; the pulse at the wrist is in consequence similarly affected; the eyeballs are protruded and their action is distorted, being usually turned in the same direction as the head and neck; the tongue is in many cases pushed forward between the teeth by the spasm of the hypoglossal muscle, and torn and lacerated by the convulsive grinding of the jaws. The difficulty of respiration, in consequence of the spasmodic contraction of the chest walls, is often considerable. After a time the supply of nerve force, which has to pass off, becomes gradually exhausted, and the tonicity of the muscular spasm ceases; the patient gives a few sobbing respirations, and the congestion of the head and face begins to diminish; irregular clonic spasms, however, continue to recur at intervals.

It is observable that this relaxation of the muscles sets in first in those which are most closely connected with the convulsive centres, these being naturally the first to become implicated in the discharge, are also, of course, the soonest exhausted and have earliest expended their quantum of nerve force. The attack over, the patient usually sinks into a deep stertorous sleep, from which he awakes with aching limbs and head, and a feeling of intense nervous prostration.

In many cases small ecchymoses are found on the

head and neck, from the rupture of capillary vessels during the attack. Such is the description of an ordinary paroxysm of convulsive epilepsy. The milder form of the disease (*le petit mal*) consists of a temporary loss of consciousness only, of longer or shorter duration; it may be so momentary as to be almost overlooked by the patient; in childhood especially it is liable to be passed over as a matter of little or no consequence. In a case formerly under my care, and which afterwards developed into severely convulsive Epilepsy, the patient perfectly remembered suffering from these slight attacks as a child, though at the time little attention was paid to them, either by himself or others. He was then in the habit of terming them "seeming hours." These seizures were probably similar in their character to those which Dr. Hughlings Jackson has described under the name of "dreamy states." Patients afflicted with this minor form of Epilepsy may be attacked at any time; but I have, I think, noticed that they are more liable to be seized with the fit of unconsciousness while taking food; at any rate, the seizure very often does occur at meal times. The patient rarely falls, but may, if standing, stagger; if walking, stumble; but in several cases, which have come under my notice, the power of walking has remained perfect during the whole period of unconsciousness. If occupied at the time of seizure, they are apt to drop or throw down anything they

may have in their hand. A child, now under my care, commonly loses consciousness while drinking, or swallowing food ; so that it is necessary that her cup should always be held, otherwise she would drop it. Patients constantly invent terms of their own to describe their seizures : thus, I have heard them called “ waves,” “ turns,” “ feelings,” “ sensations.” They are apt to vary greatly in intensity, and may range from simple transient moments of forgetfulness, or confusion, to complete and prolonged loss of consciousness. But although these former fits of confusion constantly occur in alternation with the more severe attacks, in which consciousness is totally extinguished, yet it is only the latter which can be strictly classed under the head of Epilepsy. Indeed, most epileptics are liable to suffer more or less from temporary giddiness and confusion of thought, more especially when exposed to sudden excitement, or alarm, or when walking in crowded streets. These slighter paroxysms vary very much in the outward manifestations by which they are accompanied. They may or may not be attended by slight twitchings of the facial muscles ; there may or may not be change of colour, though in many cases there is a sudden very transient pallor, at times succeeded by a flush on returning consciousness. In others the fit is announced by a groan, or sigh, or by a sudden exclamation often expressive of discomfort, or by indistinct and unintelligible mouthing ; in others

there is a curious munching or chewing movement of the jaws; in some no sound is uttered. In most cases the eyeball is fixed, and a vacant expression occupies the countenance. A variation of this form of disorder has been described, by Dr. Hughlings Jackson, under the name of "dreamy states." The patient would appear to be scarcely unconscious, but usually imagines himself to be transported to some distant locality, or to be engaged in conversation with persons whose identity he is afterwards unable to recognise. These attacks often commence with, or are preceded by, sensations of faintness, or sinking, which arise apparently in the solar plexus. The strange feeling permeates the whole body, and leaves behind a sense of prostration and considerable temporary loss of memory. A patient of mine, who suffers from the seizures, and in whom I have frequently witnessed their occurrence, has often endeavoured to describe the nature of the sensations she experiences. She says, "I have been away," "I have been talking to people I don't know," "I don't know where I have been." In this case, although a change of colour takes place, not amounting to pallor, yet the pulse is unaltered, nor does the temperature fall. The attacks sometimes last as long as an hour, and usually occur in groups of from four to eight in two or three days, after which there will be a period of complete immunity for about a month. They also frequently come on during the night.

In some cases this slight Epilepsy would appear nothing more than a prolonged hesitation while in the middle of a sentence, or an apparent inability to express what the patient wished to say. During this period, however, it will be found that there is unconsciousness. In some rare cases of this form of the disease, the length of time over which the loss of consciousness extends is considerable. A child, now under my care, in whom the attacks only come on during the night, suffers from these protracted syncope, which last in some cases over half an hour. They are only to be detected by the extreme coldness of the limbs; the feebleness of circulation is great, the child being to all appearance dead. For reasons hereafter to be explained, these minor attacks, though far less terrible in their outward phenomena, produce a far greater amount of mental prostration than those which are convulsive. Indeed, the state of mind following such seizures is often most perplexing, as patients will frequently perform extraordinary actions while thus distraught, and are usually very obstinate and difficult to manage.

In those cases, then, in which such after effects are known to occur, it is highly important that they should be in the hands of a careful and watchful attendant, otherwise distressing results are likely to occur. Dr. Gowers looks upon these sequelæ of attack as hysteroid in their nature. I have already alluded to some rare forms of convulsive Epilepsy,

in which the attacks are confined to one nerve, or one group of nerves. This is undoubtedly the history of many cases which are usually looked upon as and termed asthmatic; indeed as I shall endeavour presently to show, there is a close connection between Asthma and Epilepsy. Two cases, which illustrate this, have occurred in my practice: one quite recently, the other some years since. In the first, a boy of fifteen, who had been subject for some years to very acute attacks of asthma, was seized suddenly with convulsive Epilepsy, during the existence of which the asthma completely left him, but returned on the disappearance of the epileptic seizures. In the second case, which gives a still better example of the localised form of the disorder, a boy of sixteen, who had a strong inherited tendency to nervous disease, was liable to be attacked, especially after any unusual exertion, over-fatigue, or over-excitement, with paroxysms which were clearly due to a discharge of nerve force, down the track of the pneumogastric, as all the resulting symptoms occurred in organs which derived their nerve supply from that source; and in these the greatest irritation was manifested. The best proof of the nature of the attacks was afforded by the boy becoming, after a time, the subject of generally convulsive Epilepsy of a severe type, from which, however, he ultimately completely recovered. In these partial cases the real origin of the disorder is apt to be overlooked, or

its cause sought for in some other direction than the right, so that the neurosis may lose its partial character and become general, no remedial steps being taken. Such cases, of purely local disturbance, are not difficult to account for on physiological grounds. It is clear that the instability, and hyperæsthesia, is limited to one nerve centre only, and that the neighbouring centres are possessed of sufficient stability to prevent their joining in the discharge.

It is impossible, in the present state of our knowledge, to define with any certainty the exact spot in the nervous system from which the Epileptic seizure takes its departure. Dr. Hughlings Jackson is of opinion that the discharge originates in the ganglionic cells of the grey matter of the cortex cerebri; and this opinion is to a great extent borne out by the experiments of Dr. Ferrier, who found that convulsive seizures, identical with those of Epilepsy, could be produced by passing a Faradic current through certain regions of the grey matter of the cortex. But it would be best to give Dr. Hughlings Jackson's theory in his own words: "Scientifically," he says, "I should consider Epilepsies on the hypothesis, that the paroxysm of each is dependent on a sudden temporary excessive discharge of some highly unstable region of the cerebral cortex. There is, in other words, in each Epilepsy, a discharging lesion of some

region of the cortex cerebri. The discharging lesion is nothing more than a group of cells whose instability is raised above normal. The discharge of the highly unstable cells constituting it (the primary discharge) leads to secondary discharge of healthy cells in other centres (collateral or lower) with which there is an anatomical connection by fibres, the degree and width of the secondary discharge varying according both as the force of the current, developed by the primary discharge, and the resistance opposed by fibres, and by cells of the healthy centres." Dr. Gowers accepting, as everyone must, the discharging lesion theory of the disease, thus argues the question as to the seat of the primary discharge: "What grey matter is it," he asks, "which thus suddenly stimulates the nerve fibres and the muscles? It is hardly necessary to remark that the spinal cord acts only as a conductor, and that the over-acting grey matter is to be sought for above it, within the cranium. Regarding the encephalic masses, we have two classes of facts; first, there exists in the medulla oblongata, adjacent to the centres which regulate the respiratory movements and the state of the vessels, structures capable of giving rise by their action to general convulsions, the convulsive centre of Nothnagel. On the other hand, of all regional lesions of the brain, lesions of the convolutions stand incomparably first as causes of convulsions;

and experiment also demonstrates that irritation of the cortex in the motor region has the same effect. The tendency of experience then is, that both the cortex and the medulla may originate convulsions. The teaching of pathology is, as Dr. Wilks long ago insisted, that epileptiform convulsions have in most cases their origin at the surface of the brain. It may be doubted, however, whether the pathological facts alone, or in conjunction with experiments, quite warrant the conclusion that Epilepsy is a disease of the convolutions." Dr. Burdon Saunderson is of opinion that convulsive Epilepsy is most probably caused by the irritation being conveyed from the cortical centres to those more deeply seated, and in which the convulsive action is really organised; and this view is confirmed by the fact that motor action only becomes bilateral through the medulla oblongata. It would seem probable that the difference between the two forms of Epilepsy is determined by the direction of the discharge; the convulsive form taking its departure from the convulsive centres of the medulla, and passing unresisted throughout the body, the lesser form being a discharge from an unstable group of cells in the cortex cerebri, which, passing downwards, finds the medulla (the convulsive centres) stable and unprepared to join in the discharge, which is thus arrested. Or, it is possible that the vasomotor centre only participates in the unhealthy action, so

that a contraction of the capillary system of the brain produces a sudden and temporary loss of consciousness.

If, however, we consider what slight causes suffice to produce disturbance of the mental processes, it seems hardly necessary that the solution of the difficulty should be sought in the latter possibility. Whether, then, the discharge originates in, and is confined to, the higher centres of the cerebral cortex; or whether, as seems possible, it is referred from those centres to the medulla oblongata, from whence it takes its departure upwards through the cerebrum proper, in the form of a spasmodic capillary contraction, causing unconsciousness, must remain at present doubtful. Indeed, the weight of evidence, respecting convulsive forms of the disease, would seem to favour the belief of Nothnagel, who gives it as his opinion, "That the primary seat of the discharge, the seat of the disease, is the convulsive centre of the medulla oblongata." This central spot of the nervous system, "nodus vitæ," as it has been termed, is the seat in which motor power becomes bilateral. In the spinal cord below, divided as it is into two lateral portions, between which there is no decussation of the motor nerves, and in the cerebrum above, in which most functions would appear to be unilateral, an injury of one side produces a merely unilateral effect; and it is only through the medium of the medulla oblongata that a bilateral contraction

can be produced. This is well illustrated by an experiment of Dr. Brown Sequard's. That observer divided one half of the spinal cord in dogs, opposite to the lower dorsal vertebræ; this produced, after a period of three weeks, convulsions which affected both sides of the body, which convulsions could be at any time brought on, by irritating the nervus trigeminus of the side on which the injury had been inflicted. Thus if the cord was divided on the left, irritation of the left cheek produced the attacks; if both sides of the cord were divided, irritation of either cheek would produce them. We must infer from this, that the sense of irritation travelled slowly up the cord, to the medulla oblongata. Indeed, the convulsion could only be induced by irritation of a nerve springing directly from that spot.

I have long observed that epileptic patients usually exhibit extreme sensibility of the upper part of the spine, especially if pressure be made on the space between the occiput and upper cervical vertebra. The sensations, which such pressure gives rise to, are often intense, and are frequently referred to the stomach, as a sickly sinking sensation; to the throat, as a choking feeling; or to the face, as a sudden sensation of flushing,—indeed, a change of colour may actually occur. These facts point, no doubt, to an exalted sensibility of the whole of the upper part of the spine. In several instances I have succeeded in giving rise to the premonitory symptoms

which usually preceded an attack, by exercising this pressure. Again, facts connected with the occurrence of epileptic seizures, which have their origin in irritations transmitted by the sympathetic nerve, all bear evidence to the important part borne by the convulsive centres at the base of the brain. Dr. E. Long Fox, in treating of the influence of the sympathetic nerve in the production of Epilepsy, says, "The numerous instances of true Epilepsy, caused by reflex irritations from distant organs, travelling upwards by way of the sympathetic, are not wholly explicable by the theory of the instability of cells [by which he means no doubt the cells of the cortex]. The epileptic condition consequent on irritation of the uterus and its appendages, the gastric Epilepsy in men, which Pommay speaks of as answering to uterine Epilepsy in women, are only some of the examples of this reflex condition." The fact is that these irritations, and numbers of others similar to them, are neither more nor less than exciting causes of the epileptic seizure, and probably in this respect correspond in value to the instability of the ganglionic cells of the grey matter of the cortex cerebri; and that neither would of itself be sufficiently powerful to force on general convulsions, were the ruling centres of the medulla oblongata sufficiently stable to resist the sense of irritation conveyed to them. It is indeed evident that deficient stability of the convulsive centres, in and about the

medulla oblongata, is the principle cause of Epilepsy, and that other centres, both in the brain and spinal cord, may be liable, by their deficient stability, to discharge themselves in the direction of the medulla ; yet so long as these chief controlling points maintain their control and power of resistance, they prevent the slight partial discharge from passing beyond this point and becoming general. The only exception, I believe, to this rule, is to be found in that class of cases in which the initiating cause is so intense as to overpower the strongest and most stable nervous control ; examples of which are to be found in those cases in which exostoses and other growths from the inner table of the skull, syphilitic or other clots and tumours in the substance of the brain itself. Rapid loss of blood, as in post partum hæmorrhage, must also be classed in this category.

It has always seemed to me possible that the normal balance of pressure of circulation is one element of stability in the cerebral centres, and that when this is suddenly disturbed, as it would be by sudden extreme hæmorrhage, that the rapid loss of support causes the cells to discharge themselves. I may here remark that the views I have just expressed are not altogether inconsistent with the theory of Epilepsy propounded by Dr. Hughlings Jackson, except that he would appear to attach less importance to the controlling power of the convulsive centres of the medulla oblongata. In almost all respects he

coincides with the views of Dr. Burdon Sanderson. Further evidence as to the real seat of Epilepsy is furnished if we watch carefully the initial symptoms of an epileptic seizure: we find that the phenomena, which attend the earlier stages of attack, are all of them such as would arise from the irritation of nerves which either take their origin from, or are in intimate relation with, the medulla oblongata. Thus, the preliminary pallor is traceable to the spasmodic action of the vasomotor centre; the peculiar cry is due to sudden contraction of the rima glottidis and the contraction of the chest, which forces the air through the narrowed opening. Or, as Van der Kolk has pointed out, the first disordered action may manifest itself in difficulty of respiration. In my own experience, it has frequently happened that attacks have commenced by choking whilst in the act of swallowing—a fact which has been noticed by other observers also. Joseph Franck states that, in seven out of twenty-six patients treated at Wilna, vomiting was the first observable symptom. Now, in all these cases, which are examples of the most common forms of commencement of the epileptic seizure, the parts implicated in the production of the phenomena derive their nerve supply directly from the centres of the medulla oblongata. Other minor facts point also in the same direction. In many cases of Epilepsy, especially in children, but also frequently in old standing epileptics, there is a

remarkably free flow of saliva, often of an especially glutinous character, a fact which points clearly to an increased excitability of the centre for control of the secretion of saliva, which is situated in the same important centre. The protrusion of the tongue, again, though it is not, as a rule, one of the earlier phenomena of the attack, is an action so closely connected with, and so significant of, an irritated condition of the same spot, that it cannot be passed by without remark. It was indeed from this observation of changes, which had occurred in the capillary vessels in the track of the hypo-glossal nerve, that Van der Kolk deduced his strongest reasons for indicating these centres of the medulla oblongata as the point of departure of the epileptic convulsion. Returning to the consideration of the bearing of symptoms upon the seat of the disease, it is to be observed that in all those cases in which the source of irritation, or the exciting cause, is situated at a distance from these nervous centres, the convulsions do not become general, nor does any loss of consciousness occur until the irritation has reached these important centres. Thus, when the patient is able to describe the nervous sensations which precede the actual attack, unconsciousness always supervenes so soon as the wave of nervous irritation reaches the head; the same occurs with sensory auræ. The experiments of Drs. Kussmaul and Tenner, though they clearly misled those observers into forming an

incorrect theory as to the immediate cause of convulsions, yet afford strong proof that the medulla oblongata is the seat from which the epileptic seizure takes its departure. They first excited convulsions in rabbits, by cutting off the supply of arterial blood to the brain and medulla oblongata; they then removed the cerebrum, even as far as the crura; and in one or more instances the cerebellum itself was sliced off; yet, notwithstanding this mutilation, the convulsions still continued. These very crucial experiments would certainly seem to place the seat of convulsion below the cerebrum proper. Again, if the supply of blood to the spinal cord was cut off by applying a ligature to the arch of the aorta, no convulsions but paralysis ensued; but when the aorta was tied, and compression of the vessels of the neck also made, thus cutting off the supply of arterial blood to the medulla oblongata, convulsions came on immediately. We must, consequently, infer that the seat of general convulsion must necessarily be situated within the cranium. Yet the fact, that convulsions continued after the cerebrum and cerebellum had been removed, would clearly limit the seat of origin to the sensitive parts lying at the base of the brain, those excitable regions indeed which Marshall Hall grouped together under the name of medulla oblongata. If we now proceed to compare the facts just detailed with others which are to be gathered from the results of post-mortem examinations of

patients who have suffered from Epilepsy for long periods, we shall, I think, find remarkable confirmation of the views I have expressed.

The etiology of Epilepsy has been so little understood, that many careful and accurate observers have been led into altogether wrong and purposeless directions in their endeavours to detect in the dead body deviations from the normal condition of parts. Foville, indeed, in speaking of the results of post-mortem examinations of the epileptic, says, "*Vous ne trouverez rien, absolument rien, qui differe de l'etat normal dans le plus grand nombre des cas de cet genre.*"

It was no doubt partly owing to the dicta of men like Foville, partly no doubt to the want of accurate observation of pathological changes in the dead body, and perhaps most of all to the lack of microscopical aid, that, until of late years, so little was discovered of the true nature of the changes of structure produced by Epilepsy. For instance, Dr. Boyd, who gives the results of the post-mortem examinations of fifteen epileptics, seems to have directed more attention to the thickness of the skull, and the weight of the brain, and its general appearance, than to any minute examination of its tissues; indeed, it is not clear that in any case he examined the medulla at all, yet his reports were published as recently as 1857. It is undoubtedly to Professor Van der Kolk, of Utrecht, that the credit

is due of having first pointed out that alterations of the normal structure of the nerve centres of the medulla oblongata are to be detected post mortem in certain epileptics of old standing. He first noticed, and called attention to the fact, that the sensitive parts at the base of the brain became hardened owing to deposits of albuminous matter, which had under pressure exuded through the coats of the vessels and been deposited in the surrounding tissues. This led him to make a closer examination of the capillary system of the medulla generally, and he found that, in the case of old standing epileptics, these vessels became invariably more or less enlarged. So accurately were his investigations carried out, and so carefully did he test them, that he was able to tell with a considerable amount of certainty, whether a patient had or had not during his attacks, been liable to bite his tongue, by observing whether the capillaries, which supply the hypoglossal centre, were or were not dilated. Of course, the question still remains how far these changes are causes or results of the Epilepsy. The fact that such deteriorations only exist in cases of long standing, or extremely violent Epilepsies, makes it probable that they are due to the engorgement of the blood vessels, caused by the spasmodic contraction of the muscles of the neck during the paroxysms, and that therefore they are the results, not causes, of the seizures. Whatever may be the

real origin of the dilatation, the very fact of its existence points clearly to the important part which these structures take in the epileptic convulsion; as, unless they were intimately concerned in the disturbance, there is no apparent reason why their capillaries should suffer more than those of any other part of the cranial contents.

Looking, however, at the history of the disease, it is, I think, clear that these alterations of structure when once established, continue to act as irritants, and tend to keep up the unstable and sensitive condition of the centres. It is unnecessary to follow up the observations of other investigators beyond saying, that M. Ferrus found increased density of certain portions of the brain, probably a similar condition to the hardening described by Van der Kolk, and attributed by him to the presence of albuminous deposits, and so far a confirmation of his views. Wenzel, however, considered disease of the pituitary body to be the real "causa mali" in Epilepsy, and quoted a number of cases in which this body was found to be diseased in persons who had thus suffered. This theory was, however, annihilated by Rokitansky, who says, "I have frequently failed to discover this disease (of the pituitary body) in those who had notoriously suffered from Epilepsy and convulsions." The views of Meynert again, that changes in the structure of the cornu ammonis were frequently found in connection with

the epileptic state, are disposed of by Dr. Gowers, who says, "In the cases which I have had the opportunity of examining, the cornu ammonis has presented no pathological change, while in two cases which I have met with disease of this structure, the patients had never suffered from convulsion."

No doubt, disease and disorganisation of other parts of the brain may and do tend to the production of epileptic seizures; but they act, I believe, only as other exciting causes do, and can only produce convulsions in those cases in which the important centres of the medulla oblongata are deficient in stability and power of control. Dr. Hughlings Jackson in his *Lectures on Epilepsy*, read before the Harveian Society,* says, in speaking of the cause of the irritability of the nerve cells in Epilepsy, that "the cells suffer secondarily as a consequence of arterial disease; that there is thrombosis or embolism of small arteries in most cases of Epilepsy proper." Surely, had any such pathological change been common in these cases, it would have been observed and recorded ere now. On the other hand, it is clear that these diseased conditions of the capillaries may and do exist constantly, without giving rise to any form of convulsion. This theory also entirely fails to account for those forms of Epilepsy which have an eccentric origin; in which the exciting cause, acting from a distant organ, sends its irritation

* See *British Medical Journal*, 1879.

straight to the convulsive centres. It seems to me extremely doubtful whether any constant recognisable change of structure of brain is ever to be found at the early stages of disease; I am more inclined to believe the instability of the nerve cells to consist in alterations of their electrical status. It must never be forgotten that we are dealing with the most highly complicated structures, with the inter-relations and mode of working of which Science is still in the dark, and that we cannot compare or estimate the derangements of these extremely complex organs with those of parts of lower organisation and more simple function. Concluding what I have to say with regard to the seat of Epilepsy, Dr. Russell Reynolds unites with Van der Kolk in believing the medulla oblongata and upper part of the spinal cord to be the primary seat of Epilepsy. I may also quote the opinions of M. M. Luys and Voisin, who, from the results of very careful post-mortem examinations, conclude "That the parts which mainly suffer in this affection, are the medulla oblongata, the corpora striata, the cerebellum, and other parts at the base of the brain;" this is of course giving a very wide basis of operations, but it must be remembered that there were great difficulties in the paths of these observers, and that in a disease which has its origin in the defective circulation of an invisible and impalpable force, a disease which in its inter-paroxysmal periods

gives few indications of its existence, we can expect to find but few structural changes, and those only in old standing cases.

Summing up, then, the question as to the seat of Epilepsy, there would appear to be considerable preponderance of evidence tending to show that the convulsion centres of the medulla oblongata, and the regions surrounding those centres, are the points in which convulsion is organised ; and that, from whatever point the first causes of irritation may arise, they will prove insufficient to produce at any rate general convulsions, so long as the central controlling points maintain their normal stability. Still, even when this point is established, there are many other problems which remain demanding solution. For instance, we are quite uncertain what is the condition of the unstable cells just prior to a paroxysm ; in what way does it differ from their inter-paroxysmal state, when they are performing their normal functions with quiet and regularity, what are the causes which produce so sudden and so terrible a change. It seems certain that there must be something beyond an excessive accumulation or congestion of nerve force, though the facts attending the occurrence of seizures of simple Epilepsy tend to show that attacks occur more readily when a certain amount of nerve power has been stored up, and that if a slight paroxysm should fail to reduce the amount contained in the cells sufficiently, that a second com-

pletes the exhaustion of the supply ; but in almost all cases two other conditions are necessary, first some defective or weak group of cells, and secondly, the stimulus of some exciting cause. The congestion of nerve force, which precedes an epileptic seizure, is evidenced also by many local symptoms : there is commonly uneasiness and pain at the back of the neck, accompanied by increase of temperature. The attack itself is often heralded by minor discharges of nerve force, shown in twitchings of the facial muscles ; coupled with this cerebral congestion there is deficiency of the general supply to the body, the extremities are cold, and the surface of the body relaxed and clammy ; the mental aspect is also clearly affected, being either stimulated and excited, or irritable and depressed, being in this ruled by the natural temperament, much as we see different dispositions affected differently by stimulants. No doubt, coupled with the nervous congestion there is a corresponding increase in the arterial circulation ; the two conditions are probably closely allied.

Supposing, then, that the prevailing theory of the origin of Epilepsy is correct, viz., that it is due to the instability of one or more groups of nerve cells of the cerebral cortex, it remains to be determined, first, whether this unstable condition is an affection of the whole periphery of the hemispheres, so that they are liable to discharge themselves, first in one region, then in another ;

or whether the discharging lesion is confined to one particular group of cells, in which case we should, I think, expect to find and detect some altered condition of its constitution, on careful examination after death. The second question, which naturally suggests itself, is whether the instability is due to any inherent defect in the constitution of the cells themselves, or whether it is brought about by any altered condition of their surroundings, as for instance by any change in their nutrition; indeed, it has to be considered whether the fault lies first in the cells themselves; secondly, in the contents of the cells, for it is easy to understand that a too large or too rapid accumulation of nerve power in a single group of cells might easily lead to a sudden and complete discharge; or thirdly, in the immediate surroundings of the cells. Again, as we have seen, the completeness of the discharge is regulated to a great extent by the amount of nervous resistance which the neighbouring centres possess; and this power of resistance, restraining the onset of an irregular discharge, is evidently to a considerable extent under control of the will. That the onset of convulsion may be arrested, at its outset, by some controlling agency is evident, not only from facts which are to be observed in Epilepsy, and to which I have already alluded, but from a consideration of phenomena which we see constantly

occurring in nature. Sneezing and hiccough are two convulsive actions, which depend for their origin upon definite irritative causes; now, sudden and involuntary as spasms are, yet we see that they can be more or less completely arrested by use of powerful efforts of will, and by forcing into action some distinct energy; for the setting in motion of another action inhibits a first action, which has already commenced, by the diversion of nervous force into a different channel. For instance, in the act of micturition, if we yawn, the contraction of the bladder ceases; similar conditions no doubt exist and exercise their influence in mental processes, though this mental control is exercised more imperceptibly, and we notice its existence more when we find it failing us and when the assertion of its power becomes an effort, when we call upon it to withstand the torrent of hysterical emotion, or check the wanderings of delirium. Now, it is no doubt this unconscious controlling power which orders and regulates the distribution of nerve force in the brain; its action is no doubt very largely automatic, but we are able to note its influence in unconscious cerebration, which takes up the trail when voluntary efforts have abandoned it, and presently recalls the forgotten word or name, or supplies the missing incident. The existence of a power constantly at work, automatically directing the complex structures

of the higher brain in their operations and functions, which power we are able to some extent to render subservient to the rule of our will, is evident; and the strengthening and extrusion of this power is likely to prove of the greatest service in the treatment of that large class of disorders which take their rise in nervous exhaustion and irritability. How easily, and by how slight causes, the delicate mechanism of the higher centres of the brain may be deranged, and their action disturbed, we constantly see in the effect produced by slight injuries and concussions; even rapid jerking or rotatory movements of the head are sufficient to cause giddiness and slight unconsciousness. But while we recognise the controlling power, we must never lose sight of the fact that it is an outcome and product of healthy brain tissue, and that the less vigorous the structure, the less powerful will be its control; were this not so, we should be unable to trace its deficiency as a result of hereditary transmission, or witness its decline and extinction from exhausting illness. This power varies greatly in different individuals, and in the same individual at different periods; and a careful observation of causes, which tend towards its enfeeblement, may lead to useful ends. Careful observation tends to show that a defective control of cerebral function results from defective organisation: that the hysterical patient is unable to restrain emotion

within its proper bounds, by reason of defective constitution of brain tissue. That neurotic manifestations of all kinds do continually arise, as the result of causes beyond and outside the nervous system, we have already seen; but they can only be developed in those constitutions in which the stability of the nerve centres, and consequently their power of control, is below the normal standard. The fact that, after an epileptic discharge has taken place, a certain period is necessary during which sufficient nerve force may accumulate, to permit of a second paroxysm, points rather to the lesion in the cells as one of structure, as though the continent power of the cell or cells was sufficient up to a certain point, but when strained beyond that point it was unable to prevent the discharge; and it is probably the continued repetition of this process which constitutes really the habit of Epilepsy, and which forms one of the greatest obstacles to its successful treatment. That the surroundings of the cells of the grey matter of the cortex, in their several layers, tend by mutual support to produce an equal tension and stability seems probable; and on the other hand it seems certain that the convulsions, caused by large and sudden losses of blood, are due to some extent, at any rate, to the too rapid deprivation of mechanical support, which causes the cells to discharge themselves irregularly.

Again, the question of mal-nutrition is evidently

to be looked upon in the light of an exciting cause. We know that certain matters introduced largely or suddenly into the blood are liable to produce convulsions, as alcohol, lead, and some other poisons; and we see how a greatly lowered nutrition, as in the case of exhausting illness, lowers the nervous vitality, and lays it open to the action of irritating causes. Summing up, then, the question as to the site of Epilepsy and the reasons of the epileptic discharge, it would appear that the real and only seat of general or complete convulsive Epilepsy is the medulla oblongata; that irritating causes arising in other parts of the body, or in the brain itself, may or may not produce convulsion, as the centres of this organ may be weak or strong; that irritations in the cells of the grey matter of the cortex cerebri produce attacks of slighter Epilepsy (*petit mal*) only, if on reaching the controlling centres of the medulla they find these structures sufficiently stable to resist the discharge. With the condition of these centres, which renders them able to withstand this abnormal discharge, we are unacquainted; we must be content with the terms "stability" and "instability." The probability is that the defect is one of structure—a weakness, and beyond that an irritability; thus going rather farther than Professor Van der Kolk, who considered that "the primary cause consists in an exalted sensibility and activity of the medulla oblongata, whereby the part more rapidly answers

to every stimulus in abnormal reflex movements, or transfers its accumulated nervous or electrical force to the nerves, and discharges itself in muscular contractions."

CHAPTER II.

THERE would appear, then, to be considerable perplexity still existing as to the exact pathological conditions which give rise to the epileptic seizure. First: there is some doubt as to the exact point or points in the nervous system in which convulsion is organised, and from which it takes its departure. All that we can say, with any positive certainty, is that the starting point of convulsion is situated within the cranium. This may be said to have been demonstrated positively; beyond this, there appears, as I have endeavoured to show in the previous chapter, to be strong preponderance of evidence in favour of the convulsive centre of Nothnagel, in the medulla oblongata, being the part principally involved; and that it is only when these centres are deficient in controlling force, that external irritations, or the instability of other points of the nervous system, the ganglionic cells of the grey matter of the cortex cerebri, for instance, can be effective in producing a complete epileptic seizure. Second: we are unable to define the manner in which the dis-

charge of nerve force, which constitutes an epileptic paroxysm, occurs; or, how the irritations, which are in most cases the immediate causes of the nervous discharge, act upon the nervous centres. Third—and this is no doubt the most important point of all: we are quite unable to say, with any degree of certainty, what is the cause of the instability of these centres; what alterations are present in the cells themselves or in their surroundings, which render them liable to discharge themselves suddenly and excessively with or without the stimulus of any outside irritation. Is the derangement one of the structure of the cell itself, of the contents of the cell, or of the immediate surroundings of the cell? As it is clear that this condition of instability is to a great extent hereditary, it must be assumed that the defect, whatever it may be, is to some extent, at any rate, one of structure, though its nature and degree we are at present unable to define.

This, then, being the state of our pathological knowledge, or rather ignorance, of the etiology of Epilepsy, the most important point of inquiry would clearly be in the direction of discovering the conditions which precede and give rise to the epileptic state,* not to the epileptic seizure itself, but to

* NOTE.—I am quite aware that this term (*status epilepticus*) is usually applied to that condition . . . in which a patient has a number of consecutive attacks very closely in succession. This seems to me a misuse of the term, which I prefer to apply to that state or condition in which Epilepsy is possible.

that state of the nerve centres which permits of their discharging their contents involuntarily, and excessively on the application of slight external stimuli, and indeed in many cases without any such causes whatever. With this object in view, the only facts which are likely to aid us in our inquiry are to be derived from a careful observation of the symptoms and histories of patients who may come before us. By noting not only their present state of health, but by ascertaining as far as possible what were the causes which led to the present departure from their normal state; whether there be any reason to suspect any hereditary predisposition to nervous failure; under what circumstances they themselves had been placed; and what were the first indications or symptoms which led them to suspect that any such derangement was likely to occur.

Even at the outset of our inquiry we are met by many difficulties; for firstly, as I shall presently show, the facts relating to hereditary history are generally extremely vague and unsatisfactory; secondly, the incipient stages of Epilepsy are often extremely subtle, the first symptoms of the disease being often so slight and transient as to be almost unnoticed, or, if noticed, are likely to be put on one side as of but little moment. This is especially likely to occur in childhood, where the initial symptoms are often slighter and less pronounced

than when the disorder sets in later in life. Passing by, for a moment, the influence of heredity, we shall find, if we examine the previous histories of a number of epileptics, sufficient evidence to enable us to state, with some degree of certainty, that Epilepsy is a disease which has its origin, more or less remotely, in conditions of nervous exhaustion; and that the causes, which tend to induce it, are such as lower and depress nervous vitality. But recognising this fact to its fullest extent, as clinical observation enables us to do, we soon find that we cannot pass by a most important factor in the case, that of hereditary predisposition. Indeed, the important part which heredity plays, in the history of Epilepsy, has been noted more or less fully by every writer on the subject; but, much stress as has been laid on the point, I would feel inclined to go farther, and make an extremely strong statement regarding it, which is, that if we could only arrive at the truth, but few cases of Epilepsy would be found in which hereditary influence did not bear an important causative share. The fallacy and uncertainty of statistics, regarding the subject of this influence, are however, greater with regard to a disease such as Epilepsy, than with almost any other; for there is first, a natural reluctance in families to disclose the fact of such a disorder being hereditary among them; secondly, there is an extreme vagueness in the minds of most persons, even when intelligent, as to their

ancestral ailments and constitutional failings, as Sir James Paget* has pointed out in his essay on Heredity: "When any one says that no instance of this or that disease has ever occurred in his family, the statement is scarcely worth recording, even though it be made with more than usual consideration; very few persons have a clear knowledge of the health of their four grandparents, and I have never found any one who could tell me anything useful about the health of his eight great grandparents, to say nothing of the sixteen of the previous generation; yet, from any of these, or from other still more remote ancestors, any disease, or any considerable feature of a constitution, may be derived. There is, therefore, very little if any value in any negative evidence against a disease having been inherited." Now if the latter part of this statement be true, as it evidently is, the very positive evidence of heredity, which has been obtained in a large number of cases of Epilepsy, would, if it stood alone, tend to the belief that its influence extends over a far wider area than has been generally supposed or admitted. But it does not stand alone by any means; it is corroborated both directly and indirectly by several important facts. One of the most striking and convincing of these is to be found in the different amounts of stability of nerve control possessed by different individuals in very early life,

* "Essays": 'Evidence of Inheritance,' p. 366.

before the constitutional tendency has had time or opportunity to become affected by induced causation. Indeed, Luys* has shown that, in the new-born child, the grey matter of the cortical layer is of a uniformly greyish appearance, showing that it is fresh from the parental mould and unmodified by any changes ; in the first few years of life it is of a rosy grey, showing that an actively trophic process has begun, whereas in old age its vascularity is far less marked than in adult life. As we might expect, then, in infancy and very early life, before the individual control of nerve power is established to any considerable extent, it is evident that the power of resistance to external causes of irritation, possessed by the nervous system, is very small, so that convulsions come on far more readily than in later years when the nervous constitution has attained a greater degree of vigour. It is equally evident that different individuals display at this very early age a marked difference in the amount of power of nervous control which they possess. For, if we take a number of infants all exposed to precisely the same irritating influences, let us say the irritation of the fifth nerve in teething (a very common cause of trouble at this age), of a number thus exposed under precisely the same circumstances, it will be found that only a moiety will succumb to the force of the disturbing cause and be seized with Eclampsia, or infantile con-

* Luys : " The Brain and its Functions," p. 13.

vulsions. Now this stability, or instability, must of necessity be hereditary, as it cannot at this early age be due to an acquirement or depreciation of nervous vigour. Finding then, as we do, that a large number of cases of convulsive disease date their commencements from the first few years of life, when hereditary traits and taints are strongest and least diluted by outside influences, we can hardly fail to conclude that Epilepsy derives its origin very frequently from hereditary transmission. I wish here to remark upon the identical nature of Eclampsia and Epilepsy; they are in fact one and the same disease, having their origin in similar causes, and producing very similar results on the constitution. The main distinction between them is, that infantile convulsions more often subside with the cessation of the causes which gave rise to them. The reason of this is not far to seek, for at this early age the nervous constitution is so rapidly gaining strength, as I have already observed, that the child is in the majority of cases enabled to throw off the disease and overcome the convulsive habit, though in some few cases we see that the attacks continue and become established as permanent Epilepsy. In analysing the following tables, it is therefore necessary to explain that all cases of Eclampsia are withdrawn from the calculation, only cases of so-called true Epilepsy being included. Dr. Sieveking gives an analysis of 104 cases, in which the dates of the

commencement of the disease are divided into decades, thus:—

			Male.		Female.
From Birth to 10 years	.	.	16	.	13
„ 11 to 20 „	.	.	23	.	21
„ 21 to 30 „	.	.	7	.	4
„ 31 to 40 „	.	.	5	.	2
„ 41 to 50 „	.	.	5	.	4
„ 51 to 68 „	.	.	1	.	3
			<hr/>		<hr/>
			57		47
			<hr/>		<hr/>

Tables (quoted by Sieveking) afford us still more valuable information, as they are more extensive; and as the object of giving these tables in this place is to show the large number of cases which occur in very early life, it is important to draw deductions from the largest possible field. In 995 cases there were:—

Epileptic from Birth	.	.	.	.	87
„ in Infancy	.	.	.	.	25
„ from 2 years to 10	.	.	.	.	281
„ „ 10 „ 20	.	.	.	.	364
„ „ 20 „ 30	.	.	.	.	111
„ „ 30 „ 40	.	.	.	.	59
„ „ 40 „ 50	.	.	.	.	51
„ „ 50 „ 60	.	.	.	.	13
„ „ 60 „ 70	.	.	.	.	4
					<hr/>
Total	.	.	.	.	995
					<hr/>

Casaувieah, again, gives a comparison of 66 cases in reference to this point :—

From Birth to 5 years .	18	From 20 to 25 years .	5
„ 5 to 10 „ .	11	„ 25 to 30 „ .	4
„ 10 to 15 „ .	11	„ 30 to 35 „ .	1
„ 15 to 20 „ .	10	„ 35 to 40 „ .	2
	<hr/>	„ 40 to 45 „ .	1
	50	„ 45 to 50 „ .	2
	<hr/>	„ 50 to 55 „ .	0
		„ 55 to 60 „ .	1
			<hr/>
			16
			<hr/>

Dr. Allan Hamilton, of New York, in a similar table gives the following analysis of 183 cases :—

	Males.	Females.	Total.
Under 10 years . . .	16	10	26
10 years to 20 years . . .	23	48	71
20 „ 30 „ . . .	27	14	41
30 „ 40 „ . . .	29	11	40
Over 50 „ . . .	4	1	5
	<hr/>	<hr/>	<hr/>
	99	84	183
	<hr/>	<hr/>	<hr/>

Dr. Gowers's statistics, as quoted in his *Gulstonian Lectures*, afford similar information respecting a large number of cases, 1450. “If we take,” he says, “decennial periods, we find that under ten years of age more than one quarter of the cases commenced—29 per cent. Between 10 and 20 nearly one half of the total number—46 per cent. began; in the next

decennial period 20 to 30, the number falls to a seventh—15·7 per cent. ; between 30 and 40 only six per cent. begin ; between 40 and 50, only two per cent. ; between 50 and 60, only 1 per cent. ; and over 60, only $\frac{1}{3}$ per cent. of the total number. Thus, just three quarters (75 per cent.) of the cases commenced under 20 years.” The relation of cases to age is shown in further detail in the following table :—

Cases.				Cases.			
Under 1 year	.	.	78	15 years	.	.	84
1 year	.	.	66	16 „	.	.	84
2 years	.	.	36	17 „	.	.	67
3 „	.	.	36	18 „	.	.	53
4 „	.	.	28	19 „	.	.	44
5 „	.	.	25	20 „	.	.	40
6 „	.	.	31	21 „	.	.	31
7 „	.	.	43	22—29 „	.	.	14—26
8 „	.	.	34	30—39 „	.	.	3—13
9 „	.	.	48	40—49 „	.	.	1—6
10 „	.	.	54	50—59 „	.	.	1—3
11 „	.	.	52	62 „	.	.	2
12 „	.	.	71	64 „	.	.	2
13 „	.	.	74	71 „	.	.	1
14 „	.	.	82				

Now, after examining these statistics (which will be found arranged together in one table for ready reference on another page), we cannot fail, I think, to be struck with the evidence which they afford as to the influence of heredity on Epilepsy.

Further information is afforded by Dr. Gowers, who gives an interesting table giving particulars as

to heredity and age at commencement in 1,113 cases, of which heredity existed in 408. Now, if ancestral influence was known to exist in over one-third of the cases, it may be safely assumed that the proportion was in reality much larger when the difficulty surrounding the facts to be ascertained is taken into consideration. Dr. Gowers, after stating that the influence of heredity is "absolutely greatest in youth," proceeds to furnish the following analysis of the cases:—

Age.		Total Cases.		Heredity.
Under 20	.	844	.	319 or 37·8 per cent.
20 to 30	.	235	.	80 or 34 „
Over 40	.	34	.	9 or 26·5 „

The influence of heredity upon the nervous system is clearly more active in early youth, as Petit has pointed out; indeed, it is only natural to suppose that hereditary constitutional traits would be more clearly and more strongly marked when fresh from the parental mould, and before there has been sufficient time for the system to have acquired individual and distinct traits. It is then to the force of hereditary influence that the large proportion of Epilepsy, which we find in very early life, is to be attributed. But passing by these inferences, let us see what is to be learned from statistics as to the actual ascertained prevalence of hereditary influence; and here again it is necessary to warn the reader that the ascertained facts in all likelihood fall far

short of the reality. Thus, Herpin ascertained that 68 epileptics had 78 relations who suffered from some form of nervous disorder. Now, as among these he only includes two as having suffered from hysteria, and three from nervous excitability, it is evident, as Sieveking remarks, that he is understating his facts. Esquirol, in 321 patients, found 105 who admitted an hereditary tendency. Leech and Fox fix the proportion of epileptics in whom ancestral taint is to be traced at 36·3 per cent. Bouchel and Casauvieah give some most interesting facts: thus, in 100 epileptic patients, 31 had epileptic parents or relations more or less near. Again, 14 epileptic mothers had 58 children, 37 of these had died, the eldest at 14, the remainder at a very early age, almost all in convulsions: of these, 21 had survived, 14 were healthy though very young, some of the remainder were already epileptic. Again Eccheverria, in 300 cases noted hereditary predisposition in 28 per cent. Dr. Russell Reynolds, from a smaller number of cases, gets an average of 31 per cent. Dr. Gowers, in an analysis of 1,250 cases, obtained evidence of hereditary influence in 452, or 36 per cent. Now, the evidence in all these cases refers almost certainly to the immediate ancestry; for, as has been already shown, little or no information of a reliable character is to be obtained beyond two generations. The vast import, therefore, of all influence beyond this point of memory is entirely

unrepresented in the foregoing tables. It has been noticed by several observers, Dr. Gowers among others, that females are more likely to inherit and develop hereditary taints than males; and also that neuroses, such as Epilepsy, are more likely to descend from the mother's side than from the father's. Galton, in his work on hereditary genius, makes a similar remark concerning nervous deficiency generally. Taking then, an average estimate of the percentage of cases in which there is hereditary taint, it will be found to be certainly not less than 25 per cent.; but as all cases of infantile convulsions are excluded, and as from causes which I have already stated the difficulties in the path of accurate observation are very large, it will be allowed, I think, that the figures usually given are very much understated. Another point which still further complicates the hereditary history of Epilepsy is the fact that there are a number of neuroses all originating in causes similar to those which tend to produce the epileptic state, and which may, and frequently do, alternate with Epilepsy, that persons suffering from these may transmit the neurotic disposition to their children in the form of Epilepsy, without any suspicion of the fact of their possessing any transmissible taint. Taking all these facts into consideration, there seems to me to be well-grounded cause for the belief, that in almost every case of Epilepsy some portion of the predisposition, could the truth be

ascertained, would be found to originate in hereditary influence.

It being, then, highly probable that the liability to Epilepsy exists in inverse ratio to the strength of nervous control, which is clearly to a great extent a transmitted faculty, so that some persons possess congenitally a far greater capability of resistance to irritating impressions than others, I shall now proceed to show that the epileptic state may be induced by causes which tend to lower and exhaust nervous vitality. As a first step in this direction, I propose to examine what writers, who have had large opportunities for clinical observation of Epilepsy, have to say regarding its etiology. The particular point in question being as to whether the causes, in which Epilepsy takes its rise, are such as tend to depress nervous vitality. Dr. C. B. Radcliffe,* whose opinion must certainly carry great weight, says, in his work on Epilepsy, speaking of the general condition of the epileptic: "In very many instances, if not in all, the hands and feet are cool or cold, the pulse is scarcely ever otherwise than weak and slow, and a feeling of chilliness is almost habitual;" and in another part of the same work, he says, "I do not remember a single instance of a person suffering from simple Epilepsy, who had the red lips and face, the full pulse, the distended veins of plethora, or even a faint semblance of such a state." Dr. Watson,

* "Epilepsy and other Convulsive Affections," p. 137—138.

in his Principles and Practice of Medicine, speaks equally strongly: "Taking epileptic people as a class, you will find them generally characterised by weakness and irritability of mind and body, and not by steadfastness and vigour, by a lack rather than an excess of vitality." Dr. Sieveking also, who has had large clinical experience of such cases, says, "The great bulk of the evidence is in favour of the view that the predisposing influences enfeeble the body, more especially the nervous system. The disease is regarded by the great majority of writers, both past and present, as one of debility and impaired nutrition of an asthenic kind." Dr. Ross says, "Defective nutrition of the body generally, including the nervous system, such as is met with in anæmia, chlorosis, scrofula, and rickets, appears to beget a certain instability of the nervous system, which predisposes to the production of Epilepsy." Van der Kolk, although he admits the influence of depressing causes in the production of the disease, says nothing sufficiently definite to quote. Dr. Gowers appears to class predisposing and exciting causes together, without attempting to define the really vital question, viz., what are the conditions which permit of the occurrence of Epilepsy? Dr. Hughlings Jackson also appears to have devoted his attention more closely to the physiological side of the question. Opposed to these theories of causation is the opinion of Dr. Russell Reynolds, the only writer

of eminence I can find, who regards Epilepsy as a disorder originating in sthenic conditions. He thus sums up the question : " Since, then, Epilepsy exists without any impairment of the general health or vigour, and this in the majority of cases; since when organic debility is found in epileptics, the convulsive malady is less frequent and less severe than in the opposite condition ; since the failure of mental power is in inverse ratio to that of the general health and strength ; and lastly, since the duration of the one condition does not influence the other, we may conclude that Epilepsy does not depend on debility, anæmia, cachexia, or any such conditions." Holding these views upon the subject of this constitutional origin of Epilepsy, it is strange to find that Dr. Russell Reynolds is one of the very few writers who does not advocate the use of Bromides in the treatment of the disease. But is his view of the disease a correct one ? Putting on one side the considerable mass of evidence to the contrary, which I have quoted from the writings of other observers, does an examination of the statistics regarding the etiology of the disease tend to show a sthenic or an asthenic origin ?

Before proceeding further, let us endeavour to ascertain from as wide an experience as possible, what are the conditions and causes in which Epilepsy most often takes its rise. In doing this it is plain that we must be careful to distinguish the causes

which gradually but slowly induce the epileptic state, from those which merely serve to excite individual attacks. Thus, most patients, on being questioned as to the origin of their disease, attribute it to some irritation, either mental or physical, which has plainly been merely the exciting cause of the first seizure, passing by all anterior pre-existing conditions which had really laid the foundations of that state of health which had permitted the nervous instability to come into existence. To proceed with the examination of statistical records: Dr. Allan Hamilton,* of New York, in his admirable work on nervous diseases, attributes the predisposition to Epilepsy mainly to "bad habits, excessive venery, syphilis, and uterine diseases, which last I believe to be the most important of all. Great anxiety, overwork, also enter extremely into the etiology of the disease. Onanism is a very common cause; and of 24 such cases, I have seen during the past year, this one existed in 9." Now, it is clear that all these causes are such as may be fairly called predisposing, in contradistinction to exciting; and they are, equally clearly, such as would lower nervous vitality. Professor Van der Kolk, in his work on the Pathology and Therapeutics of Mental Diseases (p. 141), bears still stronger evidence against sexual excess.

In speaking on this subject, he says, "I have frequently had to refer the origin of Epilepsy to

* Dr. Allan Hamilton, "Nervous Diseases" (article Epilepsy), p. 318.

preceding onanism. On the inspection of the Dutch Asylum for the Insane (at Utrecht), at least, when it was still in a very sad condition from absence of the necessary control, I have repeatedly made the observation, that the number of epileptics in the several Institutions stood in a corresponding proportion to the number of onanists therein." These facts, to some extent, explain the large number of cases of this disease which occur at or about the on-coming of puberty, and during the second and third decennial periods. It is plain that the advent of puberty has a very disturbing influence on the nervous equilibrium; and the awakening of the reproductive instinct is fraught with great and special dangers. The sexual instinct, when it is intense, as it is liable to become under certain disordered conditions of the nervous system, is a source of danger, whether it be indulged in excess, or whether it be altogether repressed and kept under. The cause of onanism, as Van der Kolk has pointed out, "often lies in congestion of the medulla oblongata"; and this is proved by the fact that, not uncommonly, very young children, of 2, 3, or 4 years may exhibit considerable irritability of the sexual organs as the result of this morbid nervous condition. Excessive indulgence in venery obviously has an exhausting effect on the nervous system; but the repression of the instinct, when complete, as in many cases it must necessarily be, is equally fraught with danger; indeed,

the suppression of emotion has had an important share in the history of many forms of nervous disease. For we should, no doubt, if we could trace the evolution of Epilepsy, find that hysteria was one of the nearest links of the chain. There is a large class of disorders of semi-convulsive type, in which an absence of power of nervous control is the chief factor. More especially among these may be mentioned hysteria; and so closely does this form of nervous disorder simulate true Epilepsy, that in many cases it is difficult to determine to which class of disease it really belongs.

Hysteria is a form of nervous disorder which owes its origin purely and simply to want of controlling power. It is a disease which may be said to be, to a great extent, a product of civilisation, as a recent author has well expressed it, when, in speaking of hysteria, he says, "Emotions or feelings, as this name implies, try to go out in action, and such action, in primitive states of society, would generally be appropriate to the circumstances by which the emotions had been excited; thus, terror would naturally lead to flight, anger to attack, and the emotion in either case would liberate motive force, which would be consumed in the direction indicated. In modern and complicated states of society, on the other hand, the emotions can no longer be taken as sufficient guides of conduct, and man is constantly called upon to control the actions which they prompt."

Now, it is to this very repression of emotion, this tying down, as it were, of the safety valve, that hysteria and its kindred nervous affections are mainly due. The feelings, pent back unnaturally, at last break down the barrier of controlling power, which becomes weaker and less able to resist with each defeat. The fact, that hysteria and Epilepsy both owe their origin to the same cause, has been noticed; the distinguishing point between them probably exists in the fact that, in the former complaint, the power of control is not entirely lost; it is always there and, although for the time overwhelmed by the emotional torrent, can be called forth and made to assert itself by the application of a sufficiently powerful stimulus.

The hysterical attack, like the epileptic, will in a given time exhaust itself; the difference between them lies in the fact that in the former it is possible for the patient to some extent to modify the violence of the paroxysm; in the latter this cannot be done, as consciousness is totally in abeyance. As might be expected, hysteria is far more prevalent among females than among males. It would seem that in the former there is a more active circulation of nerve force, coupled with a less strong controlling power. Again, the period of pubescence is in the female a far more trying ordeal; in the male the transition is more gradual and less nervously exhaustive. The ill effects of this repression of the sexual instincts are

also more frequently met with in the female than in the male, and hysteria and hysterio-epilepsy are more common outcomes of it than is true Epilepsy. Indeed, the symptoms (so far as the nervous system is concerned) produced by excessive indulgence, and by complete repression of the feeling, are of a directly opposite character. By the former, an exhaustion and, consequently, a marked enfeeblement of nervous function is induced; by the latter, an exaltation and hyper-æsthesia; and although the ultimate results may present points of similarity, yet on examination they will be found to differ widely in their origin, causation, effects, and therapeutic requirements. The sexual organs influence the nervous system during the whole of the middle period of life very largely. At the advent of puberty, when changes so great and so important are taking place in the nervous constitution, it would be strange indeed if the balance of the cerebral centres was not found to be frequently disturbed. The disorders incident to this critical period of life are found to be chiefly connected with the altered conditions, and they manifest themselves very frequently by derangements of the nervous status. The sexual act has, in its effects on the nervous system, somewhat of the character of a convulsion; indeed, Galen, who is merely repeating an older writer (Democritus) terms the act of coitus *μικρα επιληψια*. Indeed, in many cases, more or less complete syncope occurs, and

partial and temporary loss of consciousness is not infrequent; in some few cases, even complete epileptic seizures may result. The first Napoleon was said thus to have suffered. It is not difficult to supply further evidence of the influence of the disorders of the sexual organs in the production of Epilepsy. Dr. Sieveking, in 41 cases of the disease, gives the cause in 3, as evolution of puberty, venereal excess in 6, uterine derangements in 9; thus in 18 cases, out of 41, the cause is connected with disorder of the sexual apparatus. Indeed, in a somewhat extensive examination of the writers on the subject, I have failed to find one who has passed by this cause of the disease unnoticed; this is the more remarkable, as reliable evidence on this subject is obviously difficult to obtain. Putting on one side hereditary influence, I should certainly class sexual irritation as by far the most active cause of Epilepsy. Indeed, in the cases of the disease which arise in the second and third decades, it is, I am sure, by far the most frequent factor. By sexual irritation, it must not be supposed that vicious indulgence is always implied; a very common outcome of congested conditions of the medulla oblongata is to be found, as was pointed out by Van der Kolk, in excitement of the sexual organs, and this often in very young children. I have seen recently two children, one of two years of age, the other four, in whom this disordered state has shown itself as a concomitant of Epilepsy.

If we compare the physical state of the patient, whom we know to have indulged in sexual excess, with that of the actual epileptic, we shall see how strikingly they resemble each other. Dr. Radcliffe's description of the epileptic applies strikingly to both conditions. "The frigid or clammy hand, the foot that will scarcely keep warm before the fire, the pale and sallow or dark and venous complexion, the habitual feeling of chilliness, are facts which appear to show that the circulation is wanting in vigour; and the inference is fully borne out by the pulse, which in simple Epilepsy is rarely otherwise than weak and slow." If we add to this the depressed and apathetic expression, which indicates a mental state as much lowered as is the physical condition, the picture is complete; for, both in the epileptic and the sexually enervated, the mental tone and vigour are undoubtedly lowered; there is a marked irresolution and uncertainty of temperament, the origin of which is, no doubt, in either case the result of an excessive depreciation of the nervous stamina.

To proceed to other causes which predispose to the epileptic state, a long-continued abuse of alcohol, or other stimulants, is one of the most common; and this not so often by the direct poisoning of the blood by alcohol, as by the rapid deterioration of nerve power which results from constant over-stimulation, or from defective nutrition of the higher centres. Alcoholism, when rapid, may produce one or more

violent epileptic seizures, from direct irritation and poisoning; thus overwhelming and disturbing the normal equilibrium and position. It is possible, also, that the congestions and ulcerations, which are very often met with in these cases, may have their origin in much the same causation; but it is incorrect to attribute the cause of Epilepsy to conditions which are in reality simply concomitant results of the same nervous failure.

Another form of over-stimulation of brain is constantly found as a cause of Epilepsy in long-continued mental strain. I have known the disease to arise, in many instances, from nervous exhaustion consequent on excessive application to work, either at books or other studies demanding intense application and prolonged mental attention. And this form of nervous collapse has become far more frequent of late years, since the introduction of the system of competitive examination, by which youths of large ambition, but small natural parts, are brought into competition with others of greater mental capacity, and naturally break down in the unequal struggle. The continued strain of brain, and prolonged effort of memory, induce a continued vascular excitement of the cerebrum, so that the rapid waste of nervous energy may be supplied by a more active nutrition of grey matter. This very capillary congestion, if long-continued and excessive, becomes in its turn a danger, by impeding the free circulation of nerve force, so that all

organs suffer from diminished nervous supply, function being interfered with and sensation impaired. These conditions, in their turn, re-a^ct unfavourably on the general health ; and this of course interferes with the general vitality, so that the baneful influences are constantly moving in a circle, each unfavourably affecting each. Under these circumstances the brain rapidly loses power, and exhaustion of the whole nervous constitution ensues, under which state the patient may develop any one of a number of disorders, one of the most frequent of which is Epilepsy. Possibly, a still more prolific source of Epilepsy is to be found in mental anxiety and worry ; though, probably, the sequence of causation is somewhat similar to that in which over-study is the prime mover. No doubt, in both cases the rapidity of progress of the disorder is modified by outside causes, such as the previous health and habits of the patient and his inherent vitality of constitution. But I am inclined to think that mental distress and anxiety are more destructive and more rapid in their lowering influence. I have, on one or two occasions, seen deprivation of sleep induce the epileptic condition ; and long-continued exposure and starvation produced the disorder in 18 sailors who were exposed on a raft for seven days without food or covering (the cases are quoted by Maisoneuve). The disease is often seen to follow long and prostrating illnesses, such as fevers.

It would be easy to extend the evidence I have thus adduced ; but it would, I think, be unnecessary. We need scarcely do more than examine carefully the condition of the epileptic, as regards his vital forces, to convince ourselves that the causes, which have brought about his disease, have been such as lower and exhaust nervous vitality. Nor is it necessary that the patient, whose condition we thus analyse, should have been himself exposed to these de-vitalising agencies. It may well be the result of a taint transmitted from the third or fourth generation ; indeed, as I have already stated, my conviction is, that the weakness of control which renders Epilepsy liable to occur, is, in the large majority of cases, due to hereditary transmission.

CHAPTER III.

IN the first Chapter, I have endeavoured to show that the seat of epileptic convulsion is in the medulla oblongata and the excitable regions which immediately surround it. In the second, I have attempted to prove that the conditions, which render these centres unstable and liable to discharge themselves abnormally and excessively, are brought about mainly by hereditary deficiency of control; but when induced, it is by causes which tend to weaken and exhaust the nervous constitution. From whichever of these causes the epileptic state has been established, we see clearly that eccentric causes of irritation, may, when the impression is transmitted to the weakened centres, set them in action irregularly, and so bring on convulsions more or less general, the extent of which will only be regulated by the amount of control which they (the convulsive centres) may still retain, or by the resistance offered to the discharge by neighbouring and more stable centres. The violence of the paroxysm may be, to some extent, influenced by the amount of nerve

force which is held in reserve; for we see that convulsive seizures are repeated at longer or shorter intervals, as the nerve force is gradually restored, and that if one attack fails to exhaust the supply, it is followed by a second. Exceptions to this rule are to be found, however, in those cases in which, in consequence of some intense irritation (often centric), convulsions follow each other with extreme rapidity and violence; not because of any deficiency of the nervous control, but in spite of the nervous stability, which is overwhelmed by the violent character of the irritating causes.

These cases are, however, happily rare, and differ materially, as I shall presently show, from the seizures of ordinary simple Epilepsy. This brings us to the consideration of the exciting causes of Epilepsy. These may be of two kinds, physical or mental; the former being the more common, and generally arising in the periphery of sensory nerves, or through the sympathetic system. The effects of irritation thus arising are often extremely rapid, more especially when the nerves, through which the impressions are conveyed, are in direct communication with the medulla oblongata: as for instance the pneumo-gastric or glosso-pharyngeal. Irritation conveyed by the sympathetic, through its chain of ganglia, also frequently act almost instantaneously. When, however, the irritating cause arises in a nerve whose connection with the convulsive centres is less

direct, the impression of irritation has to be transmitted by a more circuitous route; so that, although the same phenomena ultimately occur, yet they do so after a longer interval, and auræ, either physical or psychical, are more likely to occur. To attempt to catalogue the various forms of irritation, which may give rise to the epileptic paroxysm, would be impossible, so great is their variety and so protean their shape. It must content us to mention some of those more frequently met with, more especially as it has to be borne in mind that the treatment of the exciting cause is of very secondary importance; and it will avail nothing unless we can, at the same time, build up and restore the convulsive centres to a healthy standard of stability.

There is a distinct difference in the nature of the causes which are found commonly to act as excitants of the convulsion in the two sexes. Thus, in the male, irritations arising in the peripheral branches of the pneumogastric or sympathetic nerves are most common, and may be classed under one head as gastric irritations, as the first symptoms frequently appear to originate in the stomach or its immediate neighbourhood. In the female, on the other hand, the exciting causes would appear more often to have their origin in the uterus or its appendages. On this account the attacks are often found to come on at or about the menstrual epoch, either immediately before or after that period: in the former

case from some dysmenorrhœa, probably due to some form of flexion, or displacement; in the latter, from the natural increase of nervous exhaustion caused by the discharge. The sympathetic system is probably chiefly concerned in the conveyance of these irritations. Not uncommonly an epileptic seizure is found to originate in a fit of choking while taking food; in these cases it is not quite easy to say whether the first spasmodic action is due to the already commencing discharge of nerve force, or whether there is actually some slight difficulty experienced in the act of swallowing, which, acting as an exciting cause, sets in motion the discharge from the medulla. My own belief, having watched the commencement of many seizures, is, that it is sometimes due to one, sometimes to the other, of these causes. In a child of 11, in whom the attacks first showed themselves at the age of five, the act of drinking almost always induced fits of *petit mal*, so that she was never allowed to hold her own cup or mug; even to this day it occurs so frequently, when taking liquids, that it is necessary that a hand should be held under the cup, or she would drop it or throw it from her in the paroxysm; a similar effect is produced when she sucks sweetmeats. This case would, I think, tend to show that the irritation arose in the throat from the act of swallowing. Irritations of the trigeminus, from teething, either during first or second dentition, or the prolonged

suffering from decayed or inflamed teeth, is a very frequent exciting cause, more especially, as might be expected, in children. In several cases where the first dentition has been successfully gone through, patients have succumbed to the second. In a case now under my care, in which Epilepsy of five or six years' duration had been apparently cured by a tonic plan of treatment, it returned on the irritation produced by second dentition, accompanied by much suffering from some carious teeth, the removal of one of which, and the shock attending it, produced the first attack; this patient was debilitated also by a too rapid growth. So clearly was the connection between cause and effect marked, that I was enabled by pressure on one of the half-cut teeth, a large molar, to induce symptoms of an attack with sharp pains in the head—results similar to those which attended the removal of the carious molar. Such cases are good examples of the rapid effects produced by irritation of a nerve which has its centre of origin in the medulla oblongata. The intensity of this irritation in children, and the rapidity and force with which it is conveyed to the convulsive centres, account for the frequency with which Eclampsia occurs during the period of the first dentition. Such attacks are not usually continued, but subside on the removal of the exciting cause, mainly by reason of the rapid increase of nervous control which is going on at this period of life.

Irritation arising in the branches of the pneumogastric nerve would appear very frequently to precede, and apparently accelerate, epileptic seizures. The attacks of apparently spasmodic asthma may culminate in or interchange with Epilepsy, of which I shall give some examples hereafter; and attacks which originate in the stomach, from difficulties of digestion, are very common, especially in children, being most frequently traceable to an overloaded stomach, or the use of indigestible or improper articles of diet. The irritating cause is, in these cases, usually detected by the vomiting of the offending matters after the seizure. The same causes may, however, produce similar effects in adults; but here the disturbance is more liable to display itself by loss of consciousness only, without convulsion; this is probably due to excited action of the vasomotor centre of the brain set up by the transmission of an irritation through the sympathetic system. Indeed, it is probable that the majority of attacks of *petit mal* are caused by the transmission of irritation through this system of nerves, with consequent discharge of the vasomotor centre only, and without any extension of the lesion to the neighbouring convulsive centre. But it is not only by direct causes of irritation, such as I have described hitherto, that these convulsive phenomena are brought about. We have seen already that defective function, in the case of the menstrual flow, may

cause them, and the same is true of similar irregularities of other organs. Thus, the sudden check of the flow of bile is a not infrequent cause of convulsion; this is especially the case in children, and attacks of infantile convulsions are frequently immediately removable by the exhibition of a mild chylagogue.

Another very common cause of irritation, in infancy and childhood, is the presence of ascarides in the intestines; and similar results may occur from the existence of tapeworm in adult life. Again, the vitiation of the blood, by the presence of alcohol in large quantities, or by lead poisoning, is at times a cause of Epilepsy. With regard to syphilis, I incline to the opinion that no nervous manifestations will take place, unless there be actual deposit or some inflammatory change such as will arise from some form of syphilitic meningitis. I have several times seen Epilepsy result from thickening of the inner table of the skull in syphilitic patients. In such cases, iodide of potassium, in full doses, will usually be found effective; the same may be said of syphilitic gummata. Dr. Gowers, in his work on Epilepsy, in the chapter devoted to exciting causes, lays great stress on the opinion first advanced by Sir William Jenner, that, in most cases of infantile convulsion following dentition, the real *causa mali* was to be found in the hereditary and congenital irritability of the nervous system, which accompanies the condition which we recognise in such children under the name

of rickets. It would, however, be far more correct to say that, in such cases, there was a congenital and hereditary deficiency of nervous stability, coupled with a general lack of nervous vitality, which constituted an epileptic status; and that rickets, and several other disorders of retarded development, were merely outcomes of the same want of nervous stamina. This is precisely the point which I am endeavouring to prove in this work, viz., the existence of a predisposing cause, commonly hereditary, in every case of simple Epilepsy. Exciting causes, the existence and treatment of which are clearly of quite secondary importance, are evident; but, as in those illustrative cases which I have mentioned, where dentition furnishes the exciting cause, the really important factor of the disease is to be found in the hereditary nervous deficiency, which permits the action of the exciting cause to set in motion the unhealthy process. If, then, we take this view of the necessity for the existence of a predisposition in all cases of Epilepsy, it is evident that the action of any exciting cause will depend upon two conditions: first, on the extent to which the predisposition to Epilepsy exists, i.e. the extent of deficiency of nervous control; secondly, on the intensity of the irritating causes.

As I have already shown, Epilepsy may be produced by the action of existing irritations, so intense in their nature as to overwhelm the power of

control, however stable it may be, and where no predisposition to Epilepsy can be supposed to have existed. A most crucial illustration of this is afforded by those cases in which the convulsive centres are suddenly deprived of their blood supply, in which case convulsions invariably ensue. Those cases in which convulsions are caused by clots of blood in the brain, or by tumours or gummata irritating the meninges, should probably be also classed in the same category, as also those in which mechanical irritations of the brain or its meninges occur. Pflügen has shown that cerebral nerves, when irritated, reflect their irritability downwards towards the medulla oblongata.

I have already shown that the predisposing cause of Epilepsy, being to a large extent hereditary, is, on that account, more active in infancy than later on in life, when the natural growth of nervous control is strengthened with the development of the nervous system. Thus we see that in infancy the distribution of nerve force is far less regular, and far less under control. If we watch an infant lying in its cradle, or in its nurse's arms, we see, by the irregular jerking movements of its limbs, to how slight an extent its muscles are under nervous control. All reflex actions, also, are in the infant far less under inhibitive restraint, as for instance the acts of defæcation and micturition; the effects, also, of sudden shocks or stimuli, as of sudden loud

noises, are far more violent ; and as the child grows up, the same is seen to be true of the mind, which is indeed but a reflection of the brain, the power of emotional restraint being far less than in later years. Thus, we find that exciting causes, which in the adult would be productive of no evil result, will, in the infant, bring on convulsions more or less intense. This explains how irritations of the fifth nerve in teething, comparatively slight derangements of the stomach or liver, or the presence of worms in the intestines, are sufficient in infants to produce severe and repeated attacks of epileptic convulsions, while the more matured power of adult life enables man to resist far more intense disturbing influences. Now, taking this view of the early development of the epileptic tendency, whether we identify it with rickets, and argue that “*post hoc, ergo propter hoc,*” or whether we recognise the fact that one cause, an hereditary deficiency of nerve power, has produced a liability to two widely different disorders, it is evident that much may be done in either case to relieve the resulting ailment. On the first proposition Dr. Gowers speaks hopefully. He says, “Whether rickets is, or is not, entirely preventible, there can be little doubt that its development, to the degree in which it leads to convulsions, may always be prevented by proper attention to the diet and hygiene of infancy. These facts, therefore, suggest that a considerable proportion of cases of Epilepsy are

really within the range of preventible disease." Now, it is surprising to find that Dr. Gowers, who recognises so clearly the facts that the "retarded development," which constitutes the tendency to rickets, which in its turn develops into Epilepsy, is to be treated by proper diet and hygiene, by which he means, no doubt, to indicate a tonic and strengthening system (for no one would attempt to re-establish a retarded development by the contrary process) should have failed to recognise the truth, that the only curative treatment for the epileptic tendency generally is to be found in a re-establishment of the nervous constitution. Rickets is a constitutional disorder, the outcome of retarded development. Rickets, further developed, leads to Epilepsy; but rickets, treated by a tonic plan of treatment, may be stopped short of convulsions, ergo the best plan of treatment for Epilepsy is one which will build up and give tone to the nervous system.

It is not uncommon for attacks, which have commenced in early childhood, as infantile convulsions, under the influence of the ordinary irritations to which that period of life is subject, to subside, as the nervous stamina grows with the physical growth only to re-appear as epileptic convulsions at or about puberty. Second dentition and overgrowth are probably the most common of many causes for this retrogression; though, as I have already pointed out, puberty itself has its peculiar dangers, many of

which have their origin in precisely the same nervous conditions which give rise to the epileptic tendency itself. Of these menstruation is the most active, as it is commonly very unfavourably affected by the unstable and defective nervous states which accompany and, indeed to a great extent, constitute the epileptic condition. In examining any statistics, which authors on Epilepsy have compiled, of existing causes of the disease, it is easy to see how, in almost all cases, they have confounded the predisposing with the existing causes: that is to say, they have classed, under the latter head, exhausting influences, such as sexual excess, and prolonged mental anxiety, which should clearly, with justice, be put down only as predisposing influences; for it is clear that sexual excess would only act as a predisposing cause, by gradually exhausting nervous force, and so lowering the power of nervous control; whereas a sudden emotional cause, such as fright, could only determine an individual attack when the patient was already in an epileptic state or condition. For this reason, few tables of statistics on this subject will be found to be of any value. On other grounds also, such statistics are unreliable, for the on-coming of Epilepsy is often extremely subtle, and the cause which gives rise to the first attack of a disease, which has been gradually gaining a foothold for a length of time, has rarely an important bearing on the treatment of the disorder; the point of real importance being, to

detect and remedy those causes which have gradually so lowered the general tone of the nervous constitution as to render it possible for convulsion to occur.

As might be expected under these circumstances, vast discrepancies will be found between the tables, furnished by different authors, on the subject of existing causes. Most writers have divided this subject into the two divisions of physical and mental causation; and this method is clearly the right one. Dr. Sieveking gives an analysis of 104 cases, of which 41 were found to have a physical origin, 15 a psychical; in the remainder no cause could be assigned. Leuret's table deals with 106 cases, of which the cause was ascertained in 63; of these, 37, or rather more than one-half, were psychical, 26 were of a purely physical nature. M. Calmeil's statistical table, of 240 female patients, gives a recognised existing cause in 176; 142 of these owed their origin to psychical causes, only 34 to physical, the former thus outnumbering the latter by more than four to one. Now, when we examine these tables, we shall see that they differ so widely as to render it evident, either that the writers took entirely different views of the etiology of the disease, or that the statements given by the patients themselves were altogether unreliable and worthless. For instance:—

				Psychical.			Physical.
Sieveking in	104 cases	gives	.	.	15	.	41
Leuret	„ 106	„ „	.	.	37	.	26
Calmeil	„ 240	„ „	.	.	142	.	34

Published tables of statistics, regarding the existing causes of Epilepsy, will, therefore, evidently teach us but little which is to be depended on.

Among psychical causes, fright is evidently one of the most frequent and immediate causes of the epileptic seizure ; and so sensitive to impressions is the mental state in such cases, that the memory of a shock is likely to be retained for a considerable length of time, and to revive when the nervous vitality is again lowered. A most interesting case, bearing upon this point, has lately come under my notice, of a boy in whom attacks came on after a shock from seeing a pig killed, and who manifested the greatest horror of blood or anything connected with it, even to passing a butcher's shop, during the whole of the time that the attacks lasted, a period of some two years. He was, however, apparently cured of his Epilepsy, and the mental alarms quite subsided. Subsequently, on his being again subjected to lowering influences—overgrowth, and second dentition, and pain from carious teeth—his seizures returned in a modified form, and with these came back a revival of the old feelings connected with blood, so that his mind constantly reverted to such subjects, and he even dreamed of them. On this second occasion there appeared to be less of terror, and more of fascination, in the dreadful ideas. I have observed this peculiar dread of blood, of the sight or even of the thought of it, in many cases of

Epilepsy. A child, whose mental development had been greatly retarded by repeated attacks of *petit mal*, which came on at five years of age, had this horror of blood to a marked extent, and connected all kinds of trouble and illness with it. Terrible dreams of this kind are, in many instances, to be looked upon as, indeed no doubt are, auræ. Thus, a lady, who was recently under my care, always dreamed a night or so prior to an attack, that she saw her face, in a looking-glass, horribly convulsed; no doubt, the premonitory symptoms of a seizure occurred during sleep and suggested the dream. No doubt, as Dr. Maudsley long ago pointed out, a more thorough examination of the phenomena attendant on dreaming, and the mental condition during sleep, would tend to throw much light on many obscure and occult mental diseases.

To return, however, to the exciting causes of Epilepsy, so many cases are met with, in which attacks of asthma, or some form of spasmodic disorder which is akin to or closely simulates asthma, immediately precede or interchange with Epilepsy, the former subsiding on the occurrence of the latter, or vice versa, that it is evident that some intimate relation must exist between the seizures. This spasmodic affection, of the muscular structure of the lung, is often clearly the result of irritation of the mucous lining of that organ, the hyper-sensitive condition of which excites irritable muscular spasm; in

many cases no such specific cause is to be detected, and the attacks come on periodically, without any evident or traceable reason. Several cases, in which this sequence of events has occurred, have come at different times to my notice, and are so remarkable that I need not apologise for quoting them somewhat *in extenso*. The first is the case of a boy of 10, who was subject, every few months, to paroxysms of what were apparently attacks of very acute asthma; they were often induced by some sudden excitement or over-exertion, and were accompanied, on some occasions, by violent spasmodic action of the diaphragm; there was no loss of consciousness, but the distress which they caused was extreme, accompanied as it was by great difficulty of breathing, with, at times, violent hiccough; the seizures were always relieved temporarily by the use of bromides. I always looked upon these attacks, of which I saw several, as due to some excessive discharge of nerve force down one track of the vagus, and considered them to be of an epileptic character. This opinion was confirmed by the boy becoming ultimately epileptic, the attacks losing their partial character and being attended with complete loss of consciousness and convulsions; these, however, after some time, yielded to a tonic course of treatment, consisting of the administration of small continued doses of *nux vomica*, combined with the use of cold. A second case, somewhat similar, has recently come

under my care. A young man of 19, who had been subject for some years to attacks of acute asthma, was seized suddenly with a fit of convulsive Epilepsy, preceded by an aura which commenced in the right hand ; the attacks of asthma had remained in abeyance for some time prior to the occurrence of the epileptic seizure. No exciting cause for the seizure could be detected ; nor was there any evidence of hereditary predisposition, so that it is probable that the convulsion lost its partial character and became general, either from an extension of the unstable area, or from an increase in the intensity of the exciting cause. A third case is also very interesting, as it shows a strong epileptic tendency in a child whose mother was a sufferer from very acute asthma. E. G., aged nine, became subject to Epilepsy at the age of two, the first attack being probably excited by dentition ; the seizures were very violent and frequent, often occurring eight or ten times within 24 hours. The mother tells me that she has always been liable to attacks of acute asthma, with the exception of the period when she was pregnant with this her only child, during which time she was entirely relieved from them ; they recurred, however, immediately after the child was born. These and other cases have led me to form an opinion that there is a somewhat close connection between Epilepsy and asthma, and that the two disorders may interchange with each other, the one passing by a more or less

sudden transition into the other ; that the instability, originally localised in the centre of origin of the vagus, may become general, either by the increasing power of the irritation, or, as would seem more probable, by an extension of the instability to surrounding centres, the discharge becoming general instead of partial. I, by no means, consider this connection between asthma and Epilepsy to be proved by the evidence I have brought forward ; but I consider the subject well worthy of further examination and investigation.

In looking at the immediate causation of Epilepsy, from a psychical point of view, due regard must be paid to the imitative faculty, so strongly developed in many patients, especially in females, coupled with an hysterical or irritably nervous disposition ; such patients will produce most unfavourable reaction on each other, imitating not only seizures similar to those which they may see occur in others, but even details of such seizures. For instance, a patient, who is subject to attacks of hystero-epilepsy, having heard that another epileptic patient in the neighbourhood had been seized with mania resulting from a seizure, at once simulated a similar paroxysm ; and the occurrence of an epileptic attack will almost certainly produce a similar seizure in any hystero-epileptic, who may chance to be present. Almost all epileptics are amenable to psychical influences, and often exhibit hyper-sensibility of the faculties of

sense, more especially those of hearing and sight ; thus a loud or sudden sound will make them start, and I have seen several cases in which a sudden ray of bright light falling on the retina was sufficient to give rise to an attack. Such patients are also liable to sudden attacks of terror or despondency. This is especially noticeable in children, who, prior to the on-coming of a paroxysm, will run and take tightly hold of their mother or nurse, and display, by their manner, the feeling of great terror which has seized them. A child, now under my care, during the development of his disease, was liable to fits of uncontrollable and utterly causeless terror ; he would come running home from school saying that some animal, he did not know what, was pursuing him. The fear which many children exhibit, when in the dark, is, no doubt, a phase of the same mental condition ; it is evident that the weak and unstable nervous constitution has its reflection both in the physical and in the psychical states.

Exciting causes, which originate in the nerves of special sense, must be distinguished from auræ which often occur in these nerves. This is to be done by remembering that, in the former case, the attack only occurs after some positive irritation of the nerves, as by a sudden exposure to the rays of the sun or of artificial light ; in the latter case no such real source of irritation exists, but the aura consists in a false impression of light, a hallucination or, at

any rate, an illusion of sight. Indeed, in the former the action of the nerves is the cause, in the latter it is the effect, of the epileptic discharge, as the deranged sensations are clearly due to the stimulation of the nerves by the already commencing discharge of nerve force. This distinction is well marked in two cases which have recently been under my care. In the first of these, a young man of 19, it was found that so great sensitiveness of the optic nerve existed, that the rays of the sun suddenly impinging on the retina would bring on an attack, so that it became necessary to protect his eyes with coloured glasses. In the second case (one of special sense aura) the patient always saw, prior to an attack, a dog surrounded by red rays running about the room. It would be useless to go more into detail on the subject of exciting causes. It will only be necessary to sum up the whole position by saying, that, supposing a certain deficiency of nervous control to exist, whether it be an inherited debility, or have been induced by causes which lower and depress nervous vitality, any irritation may suffice to set in motion an abnormal and excessive discharge of nerve force, in other words, to produce an epileptic seizure. But it will be found that those nerves, which are most nearly connected with the sensitive parts in and around the medulla oblongata, most frequently act as transmitters of these irritations; and that, as a rule, the more intimate the connection

between the nerves up which the irritation travels and these centres, the more rapidly will the attacks come on.

CHAPTER IV.

I HAVE already said, that the treatment of the exciting causes of Epilepsy is comparatively of slight importance ; that the success or failure of the treatment of the disease must depend upon whether we can get rid of the predisposition to Epilepsy, which I have described as a deficiency of control of the convulsive centres, and a general lack of retentive power of the ganglionic cells of the grey matter. Now, as we have already seen that this predisposition is probably to a great extent hereditary, or, when induced, the result of continued exhaustion of nerve force either from over-exertion, over-excitement, or over-stimulation, it is certain that the restoration and building up of the lost power must be a work of time, and cannot by any means be effected suddenly or even rapidly. When the main cause of the disease is hereditary deficiency of nervous stability, Epilepsy is, as I have already said, likely to show itself in very early life ; so that even when the child escapes the sources of irritation to which infancy is liable, and the convulsive disorders which arise from

them, it is almost sure to exhibit the epileptic disposition, during the first few years of life, with greater or less intensity, according as the hereditary predisposition is more or less. Now, although this early development of the disease is unfavourable, in many ways, as showing a naturally unhealthy nervous diathesis, yet it contains a considerable element of hope, in the fact that in early youth the control of nerve force is daily increasing with the growth of the nervous system itself; there is, therefore, a natural tendency to cure of the defective condition. This natural restoration of power it should be our constant aim to strengthen and increase. Moreover, additional encouragement is to be derived from the fact that, besides the efforts of nature to restore the balance of nervous control, we have not, in these early stages of disease, to deal with those structural changes of brain which continued convulsive seizures are always likely to induce. Again, a more ready response to curative measures is likely to be found in these earlier years, so that a slight addition to the nervous vigour is followed by a still greater gain which, "*vires acquirens eundo*," leads the patient gradually upwards on the road to nervous health. How largely hereditary deficiency of nervous control is to be overcome is probably most readily shown in the cases of those children we so commonly meet with, in whom, without that instability of the higher centres which constitutes Epilepsy, there is con-

genitally defective regulation of nerve force—arrest of nervous development, it is often called. In such children there is, throughout the whole nervous system, a want of co-ordination of power; with, perhaps, plenty of strength in individual muscles, there is a marked want of definite purpose. Such children fail to walk, speak, or indeed perform any of the ordinary acquired actions or movements, at the proper age, and when they first commence them, their vague, ill regulated efforts show to how slight an extent their muscles are under the proper nervous control. This is especially noticeable with regard to the smaller muscles, those which are devoted to the performance of more delicate and special functions: for instance, in walking, such a child will move the thigh with a fairly regulated, though uncertain, flexion and extension, but the smaller muscles, which should co-operate in the action, remain passive or fix the toes in rigid extension. The same is noticeable with regard to the hand and arm; should the child wish to pick up a small article from the table, for instance, the arm will direct the hand rightly towards the object, but the fingers will be unable, from the want of co-ordination of their muscles, to grasp the object, which will probably be seized by the palm of the hand, when the fingers will clutch it. In the mental condition the same deficiency of controlling power is manifested; the mind is warped and distorted, and the government of emotion is slight and defective;

such a child will laugh or cry without sufficient cause, and is as capricious in its moods as in its movements. Such children commonly develop considerable distortion of their moral faculties, the brutal qualities of the mind being intensified at the expense of those which are higher and more refined.

A still more striking illustration of the possibility of restoring lost nervous control, is furnished by the manner in which this power can be built up in cases of chorea. In this disease the power which regulates the discharge of nerve force down the motor tracts is more or less completely enfeebled, so that intermittent currents are discharged in one or more directions, not voluntarily or by order of the will, but in spite of it. In some cases so complete is the loss of control, that every muscle of the body appears to be set in uncontrolled action. It differs from Epilepsy in so far that mental control and consciousness are not lost, though they are often lowered in power and more or less enfeebled. It is a form of disorder peculiar to youth, and is manifestly induced by causes which exhaust and depress nervous vitality, in this resembling Epilepsy. Yet it is found that, by improving the general vigour of the nervous constitution, such cases recover their lost tone with rapidity and certainty. In both these forms of nervous disorder, which bear some relation to Epilepsy, either in the causes from which they spring, or in their semeiology, even in the worst of them, much is

to be done by judicious treatment to build up a nervous constitution. The best method of attaining this end is by carefully feeding and strengthening the nervous constitution, at the same time that we endeavour to procure a stronger power of control and a better distribution of nerve force; these latter objects being attained by a judicious use of cold, by careful and well directed rubbing and massage, and by the use of electricity, such as we may find adapted to the case. If, in these cases, a plan of treatment founded upon these principles be begun early, and persevered in unceasingly, it is astonishing how much progress may be made even in the most apparently hopeless cases. While carrying out this plan of treatment, all exciting causes of irritation or depression, either mental or physical, must be carefully guarded against, and one of the most dangerous of these is ill-advised parental sympathy; indeed, during the progress of the case it is far better that the patient should be completely removed beyond its pale. Care must also be taken that the increase of nerve force should be brought about slowly and gradually; any attempt to stimulate, or even unduly to tone, the nervous constitution, is certain to result in ill effects; for, if the nerve force be generated more rapidly than the weakened centres can dispose of it, troubles are likely to come on infinitely more dangerous in their activity than was the original passive deficiency of control.

Now, if in these cases, which are clearly the result of defective regulation and distribution of nerve force, it is possible to build up and establish a nervous constitution, it would at any rate seem not hopeless to strengthen the nervous system in the epileptic, in whom the defect consists not so much in the general absence of nerve power, as in the instability and want of control of one or more points of the higher centres. It is worth while to endeavour to ascertain somewhat more definitely what we mean when we speak of power of control in connection with the nervous system. It is very clear what effect its absence has on the motor power (for the faculty is better analysed in the negative way by its absence or deficiency). We see a patient afflicted with chorea, the limbs jerked and thrown about involuntarily and beyond the power of control; this is a somewhat extreme instance of this deficiency, which is perhaps better illustrated, in a minor extent, by the twitchings and startings to which numbers of nervous persons are habitually subject. Looking again at the mental aspect, we see a distinct reflection of the same condition showing itself in want of strength of mind: there is an inability to suppress and hold emotion in check; laughter and tears are both easily excited, and once aroused are difficult to check; there is also a manifest want of decision and power of will in such persons, a yielding and indecisive disposition. Dr.

Maudsley has admirably described this morbid condition in his "Pathology of Mind," classing it as one of the Insane Temperaments, he says, "it is characterised by extreme vacillation and irresolution; it might be truly described as the vacillating and self-tormenting variety. Those who have this temperament are distressed beyond measure when they have to decide anything, however trivial; cannot come to a decision out of apprehension lest it should be wrong, and worry themselves and others with the many times reiterated arguments for and against."

This deficiency of control is markedly characteristic of hysteria, and is manifested both in the physical and mental constitution; it is also undoubtedly one of the main causes of Epilepsy, for we commonly see that a patient may, by a strong effort of will, throw off an impending attack, even after the warning sensations, which frequently precede such seizures, have shown themselves. It is difficult to say what is the precise method by which the progress of the attack is thus inhibited; possibly, by the forcing of the current of nerve force into other channels, and thus diverting it from the unstable discharging centres. That this power of control partakes somewhat of the nature of confidence, is shown by the curious manner in which the hope of cure almost invariably secures a complete immunity from attack for a longer or shorter period;

and this fact points strongly to the importance which should attach to the psychical treatment of the disease, which has hitherto been either entirely neglected or left in the hands of empirics and charlatans. It very commonly happens that the trial of a new drug, or of a fresh system of treatment, will have a marked influence in diminishing the number of attacks. Almost all writers have noticed this. Esquirol says, in allusion to this point, "*Toujours un nouveau médicament suspendait les accès pendant quinze jours, chez les unes pendant une mois, deux mois chez les autres et pendant trois mois.*" How much may we not hope from a development and strengthening of this latent power! That it may be lost and regained, we see clearly in the results of long-continued and exhausting illnesses, such as prolonged fevers, etc., when both mental and physical states bear evidence to the great exhaustion of nerve force which has taken place: not only do we find the body weakened and motor power but slightly under control, but we see clearly how weak and uncertain is the rule of will; emotion is very near the surface and is difficult to control. Yet when this patient, built up by appropriate measures, begins to return to his natural standard of power, we see all these signs of weakness disappear, the muscles regain their power of control, and the natural vigour of mind re-asserts itself.

The influence of mind upon body is a subject far

too wide for treatment in a work such as this, yet it has so distinct a bearing upon the etiology and treatment of all nervous disorders, that it is impossible to pass it by without mention; and it is probable that great benefit might be derived from a better understanding of its workings, and a more scientific application of its forces. Dr. Weir Mitchell's* views on this subject bear so strongly on what I am saying, and are so admirably rendered, that I must be excused for repeating them somewhat *in extenso*: "You are aware," he says, "that every one has some capacity for mentally influencing or disturbing functions of the body which are usually not under the control of volition; a few well people have this in a marked manner, and in some hysteric or nervous states this power becomes enormously increased and widened in range. It is clear, then, that we can sometimes acquire such control over functions supposed to be outside volitional rule, and that this is made easier in certain temperaments, and in states of hysteria, feebleness, or nervousness;" and again, after describing two amusing cases in which diarrhœa was always produced by mental excitement, he says, "In like fashion arise and continue certain of the forms of cardiac and vasal nervous disturbances. First, there is some sudden and unusual influence disturbing the circulation; then, upon the occurrence of lesser but like causes, a similar trouble arises

* Dr. Weir Mitchell, "Diseases of Nervous System."
2nd Edition, 1885, p. 59.

until a morbid habit is fully formed." How exactly this description applies to the manner in which the habit of Epilepsy arises and is continued! The strong influence of psychical impressions in Epilepsy is well shown in the effects which empiricism and mere superstition often exercise on the disease. The use of charms and such-like survivals of superstitious belief still largely prevail in the unscientific treatment of the disorder, and no doubt this survival has been the result of their favourable psychical effect.

The influence of mental and emotional exciting causes, in inducing attacks, also points in the same direction. Thus, Dr. Gowers attributes the most potent influence to these psychical shocks, such as fright, excitement, and anxiety; and other observers are of the same opinion. The strong sympathy which exists in all this class of diseases must also be mentioned, as it clearly has its origin in lowered power of will. Under its influence a patient will allow impressions to overwhelm the nervous stability. To such an extent may this occur, that, under certain conditions, diseases nearly akin to Epilepsy have at times become epidemic, affecting large numbers of persons by strong mental sympathy. This same condition is often seen to arise, to a minor extent, in the present day in this country, when a number of persons of similar temperament are placed under similar conditions which excite their morbid sensibilities.

The treatment of Epilepsy from this psychical point has, undoubtedly, been much neglected. It is easy to recognise, as I have just pointed out, the important influence which the mind exercises over all these forms of disease; but, notwithstanding, almost all writers dismiss the question, even when they notice it at all, in a few paragraphs, in which attention is chiefly directed to the prevention of the disease by early moral supervision, and pass by in silence the curative effect of such discipline. One of the first points necessary, in applying this form of treatment in Epilepsy, is an entire change of mental surroundings. It will commonly be found that the moral atmosphere in which your patient is living is the worst possible for him, especially in those cases in which hereditary influence is to be traced, for here the persons most intimately connected with the sufferer—often those who have the immediate care of him, are possessed of similar unstable traits, a condition which is clearly most unfavourable for both parties: they are certain to re-act disastrously upon each other. A change of surroundings is, in such cases, certain to be attended with most beneficial results, especially when the change is from an atmosphere of moral instability to one of firmness and strength. Keeping in view this object, I have for many years been in the habit of placing children, and indeed young patients up to and beyond 20, in the hands of skilled persons accustomed to the

charge of such cases. For, beyond the mere alteration of their condition, much benefit is to be derived from inculcating and impressing the improvement of moral force. It stands to reason, if a patient discovers for himself that he is able, by his strength of will, to delay, or even in some cases to ward off, the on-coming of an epileptic seizure, that any increase of this power must tend in a curative direction. Of course, it must be admitted that this faculty of postponing the onset of a seizure is not a common one; but even when attacks occur without sufficient warning, it is often possible, by cultivating a power of resistance to slight nervous sensations, and other phenomena which are present in almost all cases, to establish an improved state of nervous stability, which after a time has a favourable effect in lessening the force of the disease.

That the power of nervous control can be restored when lowered, and supplied when congenitally deficient, is evident, as I have endeavoured already to show, and one of the most effective means of doing this may be found, I am confident, in moral treatment. Indeed, in all those diseases which have their origin in hereditary influences, and which, resulting as they do from the same lowered nervous condition, yet are found to be transmitted from generation to generation, not always assuming the same form, but interchanging among themselves as individual temperament or constitution may direct, moral force

is a most important curative agent. We see its beneficial action most clearly, perhaps, in Hysteria, and in decreasing degree in Insanity, Epilepsy, and Chorea. No one can doubt its influence in Insanity; and its application to the treatment of mental disease has, almost within the memory of man, entirely revolutionised the treatment of that form of disorder. In Epilepsy it has been hitherto but little used, though for reasons which I have already stated, there is great hope that most satisfactory results would follow its employment. In almost all cases of Epilepsy, the mental as well as the bodily state is depressed. It is evident, therefore, that by raising and improving the one, without at the same time endeavouring to build up the other, we are attempting a one-sided operation. It is true that mental improvement will follow, if the brain be physically strengthened, but much is to be gained by looking simultaneously in both directions: any fresh mental energy we can develop, and every seizure we can avert, or even delay, are material steps towards a successful result.

To proceed, then, to the method by which we shall be most likely to re-establish the exhausted nervous vitality and restore the power of nervous control. If the propositions which I have laid down in the previous chapters be correct, it is plain that we shall effect, in the large majority of cases, nothing permanently useful by treating our patients with

bromides, the action of which is clearly, as I think I shall be able to show in the following chapter, merely palliative; its action being simply to numb temporarily the hyper-sensitive or irritable centres, while it still further depresses the already lowered vitality. The only hope lies in restoring the lost power of control. No doubt others have taken the same view of the disease and have endeavoured by a tonic system of treatment to effect its cure, and I think it is clear why they have failed. In all cases they have, I think, lost sight of the fact that a weak nervous constitution is always intensely irritable, and that the greater its weakness the greater will be its irritability; for this reason it is generally found that any form of nervine tonic, unless given in a most cautious and guarded manner, appears to aggravate the very evil it was meant to cure. If we note the results which follow the exhibition of ordinary doses of nervine tonics in Epilepsy, during the first few days the patient usually expresses himself as feeling much better and stronger, but after a longer or shorter interval, an attack possibly more violent than usual occurs, or the interval between the seizures is distinctly shortened; so we find that although the first effect of the medicine is so far satisfactory, inasmuch that the patient experienced a sense of increased vigour, yet the attacks themselves are increased both in severity and number. It is clear, then, that we must either abandon altogether the principle upon

which we have attempted to cure our patient, or pursue a somewhat similar system in some modified form. Now, if we bear in mind what has been said respecting the probable origin of the epileptic condition, we shall, I think, find a rational solution of the difficulty. The abnormal discharge of nerve force, which constitutes an epileptic seizure, is due to an accumulation of nerve power in cells which are unable to retain it, and this statement involves two distinct conditions: first, an instability of the cells; and second, too great or too active a supply of nerve force in a particular spot. Now, it is plain that the treatment should be applied towards the relief of both these causes; we must not only strengthen the weak and unstable cells, but we must at the same time prevent a too rapid congestion of nerve force within them. The difficulty plainly consists in the fact that, in endeavouring to accomplish the first part of the plan, we defeat our own object by causing too rapid an increase, and consequently too active a congestion, of nerve power. It results, therefore, that we have, while building up the lost power of the cells, to divert the flow of nerve power into other directions. Now this is to be effected in more ways than one: firstly, it may be done by diverting the flow of nerve force in the direction of the body or extremities, thus lessening the supply to the brain; secondly, by withdrawing from the neighbourhood of the excited and unstable centres, without attempting

to regulate the general supply. Now, the first of these measures, when it can be effected, is naturally the wisest and most effective, for if we examine the condition of most epileptics, in relation to their distribution of nerve force, we see that though manifestly deficient in the general amount of electricity (which term I use as a synonym for nerve power) which they possess, they are also markedly liable to its passive congestion, that is to say, that not only is the amount generally deficient, but also that the distribution of it is most unequal. Considerable evidence of the truth of this statement is furnished by contrasting the state of the head with that of the rest of the body; the brain is evidently surcharged, the rest of the body drained, of its nerve force. As general vigour decreases, so nervous instability grows more intense; this is always observable when the nervous vitality is lowered by prolonged disease or by rapid and extensive loss of blood. What has to be done, then, in such cases is to drive nerve power downwards, to cause it to flow with increased activity in a downward direction. By doing this we not only relieve the surcharged centres, which already find it difficult to retain their control, but at the same time increase the supply to the rest of the system, which is suffering from deficient circulation, both of blood and nerve power. When once a more active habit of circulation is promoted, a general improvement follows the increased activity of function;

digestion and assimilation being carried on more completely, increased nervous tone naturally results.

It is by some such process as this, that the tying of a ligature round a limb, in which the premonitory twitchings announce the commencement of an epileptic discharge from some unstable area of brain, suffices to increase the power of resistance of that discharging centre, and enables it to resist the abnormal discharge. Dr. Gowers, in his admirable work on Epilepsy, makes the following remarks in reference to the subject of the arrest of impending attacks: "The most common mode by which the arrest is effected is by the application of a ligature round the limb above the point convulsed." After going on to explain that this method of averting the seizure is equally efficacious in cases where the convulsions are due to organic brain mischief, he continues: "This shows that the arrest must be effected not in the limb but in the centre in which the discharge is occurring of which the local convulsion is the outward manifestation; the strong peripheral impression on the limb above the part convulsed probably raises the resistance in the nerve cells of the corresponding part of the brain, and thus arrests the spread of the discharge. The reason why the ligature is especially effective is probably partly because the cutaneous stimulation is applied to the entire circumference of the limb, and so influences the whole extent of grey matter in

which the discharge is advancing; occasionally, however, a more limited cutaneous stimulation, as a prick or a pinch, has the same effect." The repeated arrest of fits by the ligature may produce a permanent effect; and after quoting a case in which the beneficial result was obtained, he says, "the use of the ligature appeared to have produced a permanent increase of resistance in a certain part of the unstable nerve tissue." Now, can anything seem to offer a fairer prospect, for the production of permanent relief in Epilepsy, than a careful and steadfast attention to the development of this method of treatment? Whether the arrest of the attack be brought about by a powerful effort of will, or by an active stimulation of the cutaneous surface in the region corresponding to that of the commencing aura, it is probable that the process which goes on in the brain is much the same in either case; there is probably a diversion of nerve force in the direction of the more powerful stimulus, for facts would tend to show that nerve force is very easily diverted in this manner. The fact that intense mental excitement prevents the pain of even a severe wound from being felt, and the rapidity with which a train of thought is changed, so that we entirely forget in one second a thought we were about to express in the next, both show that nervous energy is readily turned in the direction of the most powerful stimulus. Whatever the actual physiological process may be, it

is evident that the subject demands a larger share of attention than has hitherto been given to it, as it appears to offer hope of a solution of one of the greatest difficulties to be overcome in the treatment of the disease, viz., the interruption of the sequence of the attacks. Now, in my experience, the effect of active and continued rubbing, and massage, coupled with a judicious use of cold, do undoubtedly lessen the tendency to attack, and they do it probably in several ways, possibly as Dr. Gowers suggests, "by producing a permanent increase of resistance in the unstable nerve tissues," and also probably by lessening the amount of nerve force in the brain generally, thus relieving the pressure on the unstable centres, and possibly also by increasing the general nervous vigour, and thus strengthening the power of control, a process which necessitates great patience and perseverance on the part of both doctor and patient, it being both gradual and tedious.

When we examine the various forms of nervous disorder which, though they present different phases and vary much both in their physical and moral phenomena, yet spring from the same condition of nervous exhaustion and asthenia, we see after a time how they merge one into the other, and how clearly they owe their origin to one source, and how similar are their therapeutic requirements. So that the scheme of treatment, which I have applied more directly to Epilepsy, is in reality adapted to the

treatment of a far wider range of disorders. It may be here remarked that the plan of treatment will be inefficacious unless it be carried out in its entirety, for it will be found useless to attempt to build up the devitalised system unless we can at the same time lessen the nervous excitability and sensitiveness; and to effect this, I prefer, as far as possible, to rely upon derivative action in preference to the use of bromides, as the influence of the former tends to increased power and improved function generally, while the effect of the latter is temporary and depressant. No doubt many cases are met with in which the immediate numbing effect of bromides is imperatively demanded, but its use should be discontinued as soon and as completely as possible. And this brings me to a more complete consideration of the action of the bromides in nervous disorders generally, but in Epilepsy more especially. It is not difficult, I think, to see how this plan of treatment has been so universally adopted. I have already pointed out that irritability and hyper-sensitiveness are invariably outcomes of nervous exhaustion, and if we can diminish or get rid of the latter, the former condition will disappear as a matter of course. Now the existence of this excitability to reflex stimuli is one of the main factors in Epilepsy, as under its influence slight irritations act with far greater intensity than they otherwise would. Now, any measures which will lower this irritable nervous

state will procure a certain amount of immunity from attack; but it is plain that it can only be a temporary alleviation, as unless the primary cause, viz., nervous exhaustion, be removed, its influence cannot fail to reassert itself; in short, we find that we are only treating one of the symptoms of the disorder, and not the disease itself. Now this is clearly the action of bromides: they act by lowering the functional activity of the nerve cells, and so lessen the frequency of attack, but they in no way affect favourably the primary conditions upon which the disease depends; indeed it is probable that their effect in this direction is mainly unfavourable, as tending to still further lower and depress the nervous vitality. No doubt many cases are permanently benefited by the action of these medicines, and these favourable results are attained, I believe, in two ways: first, by the palliative action of the bromides giving time for the nervous constitution to regain its lost power. This would be more likely to result, as I have already pointed out, in patients who had not as yet attained their nervous maturity; secondly, by its breaking the habit of attack, for as each seizure renders the liability to convulsion greater, so no doubt the immunity from the paroxysm gives a chance for the restoration of the nervous equilibrium. No doubt we should attain much the same result could we by any means, say by freezing the excitable centres, destroy their hyper-æsthesia, but we should

in this case also produce little more than a temporary alleviation of the more prominent symptoms of the disease.

Regarding the treatment of Epilepsy, then, we have to consider two main points: first, the degree of nervous exhaustion, whether it be hereditary, induced, or due to a combination of both causes; secondly, the extent to which this exhaustion exhibits itself in hyper-æsthesia, as the greater the excitability of the nervous centres the more difficult and protracted will be the cure of the disease. As a rule, rapid exhaustion of nerve force implies the possibility of a rapid restoration, but in cases which depend upon hereditary transmission, or when the devitalising causes have been of a severe and protracted nature, it will be found impossible to build it up rapidly. Nervous energy may be acted upon in three distinct ways: it may be stimulated, toned, or nourished. Now, in applying these three methods to the treatment of Epilepsy, we shall find them useful in the following order: stimulation, I might almost say, never; the second or tonic system more often, but still rarely; the nutrient always. We may, therefore, in treating of the therapeutics of Epilepsy, safely put on one side the attempt to stimulate the nervous system into health, for as all stimulation implies sequent reaction, and as the reaction is greater and more lasting than the stimulation, we should be adopting measures calculated to defeat

the very object we have in view, viz., the maintenance of a stable equilibrium and balance of nervous circulation. With regard to the tonic plan, in many cases, especially those in which the normal standard of nervous strength has been rapidly lowered, tonic doses are not only well borne, but produce the happiest and most rapid results. A good instance of this is to be found in those cases in which convulsions ensue from excessive overstimulation from alcohol; here even large doses may be given with good effects.

But before going further, it will be well to examine the methods of treatment now in vogue, and to notice how far they are successful both from a curative and a palliative point of view, and whether the action of the medicine generally prescribed adapts itself reasonably to the etiological theories generally recognised. The popularity of the treatment by bromides is almost universal in the present day, among all classes of the profession. So popular is it, that it seems almost audacious to throw doubt on a system of treatment so widely recognised and adopted. But I propose to do so, and I found my objections to it on several grounds: first, on the fact that its action is diametrically opposed to the rational theory of the causation of Epilepsy as recognised by the best observers; secondly, that its action is purely palliative, not curative; thirdly, that by producing results exactly the reverse of those

demanding by the necessities of the disordered system, it not only does not cure, but it lessens the ultimate chance of recovery both by checking the natural growth of power of the nervous constitution, which we see constantly taking place up to a certain period of life, and also by lowering the amount of nervous vitality which the patient may still possess. I have already endeavoured to show, not altogether, I hope, without success, that Epilepsy is an outcome of enfeebled nervous states; if, in addition to this, it can be shown that the bromides—especially the bromide of potassium, which is the most fashionable of this class of remedies—do by their action depress, and not strengthen, the nervous constitution, surely it will be admitted that I have succeeded in proving my first proposition.

It will then be necessary to show for what reasons the drug has obtained so wide a popularity, and whether its claims as a curative agent in Epilepsy are well founded. One of the most enthusiastic admirers of the bromide treatment, as applied to Epilepsy, is Dr. A. Hughes Bennett; yet in his recently published brochure on the subject* he describes the action of “medicinal doses of the bromides on healthy persons as productive of a general diminution of nervous energy.” Yet what is this author’s description of the epileptic, which we find on the same page of the same work? He

* “Epilepsy and Its Treatment.” A. Hughes Bennett.

says, “although some persons suffering from epileptic seizures are in the intervals, of sound mind and body, in many the inter-paroxysmal state is characterised by certain symptoms peculiar to the condition and independent of any form of treatment. The general health is frequently unsatisfactory, the functions of the body being impaired in vigour, the digestion is weak, and the circulation feeble, the entire nervous system is in an unstable condition, the patient being at one time irritable and excitable and at another depressed and despondent. There is a very common condition of so called ‘nervousness,’ which is accompanied by headache, pains, tremors, and a variety of other subjective phenomena. The mental powers are enfeebled, the memory defective, and these intellectual alterations may exist in any degree. The physical conditions may also be changed, the nutrition of the tissues is often imperfect, the skin is pale, the muscles flabby, and the motor powers generally enfeebled.” Place these two statements side by side—the action of the drug and the symptoms of the disease, and then ask the question, can the cure of the latter be rationally hoped for from the use of the former? It is true that, in another part of the same work, he endeavours to explain away the palpable inconsistency, by suggesting that the drug affects the epileptic in a different manner, whereas the truth is that it owes its effective action as a palliative in that disease solely to the

power which it has of lowering nervous energy and thus subduing the hyper-æsthesia of the convulsive centres. Indeed, if we examine carefully the action of the medicine, we shall see clearly how it has earned its well-deserved reputation as a palliative in Epilepsy ; but we shall find, at the same time, that its effects are clearly opposed to the establishment of any curative process. Dr. Allan Hamilton,* of New York, in speaking of the use of these medicines in the treatment of Epilepsy, says, " No one drug can be declared a specific, as I am sorry to see has been done ; and we must not be too eager to accept the sanguine results of certain over-enthusiastic authorities, and be governed thereby. I allude more especially to the almost universal use of the bromides to the exclusion of everything else, and also to their employment in quantities which often ruins the patient or, at any rate, produces a condition of diminished vitality which is inconsistent with any hope of success. Radcliffe's idea on this subject is a good one : ' There is a reason to believe that the therapeutics of convulsion must be based upon the notion that the vital power has to be re-inforced, and not upon the contrary opinion.' And now regarding the large doses, if the idea is to thoroughly ruin the patient's health, to enfeeble his mind, or perhaps drive him to an asylum, the toxic administration may be indulged in."

* Dr. Allan Hamilton, "Nervous Diseases" (New York), p. 327.

It is clear that Dr. Allan Hamilton does not consider the bromides to exercise a distinct or tonic action in the epileptic. It is altogether impossible, I believe, to dispute the statement, that the exhibition of bromides in doses sufficiently large to produce physiological effect, and lessen the tendency to attack, must tend to depress the nervous vitality. No doubt, there is a vast difference in the amount of the medicine which it takes to affect different individuals, some being able to take large doses with comparative immunity, while others are almost poisoned by much smaller quantities. A patient, lately under my care, exhibited all the toxic symptoms in their most intense form, from 15 grain doses repeated twice daily for a few days, her speech and power of walking were both much interfered with, her memory failed, and she had every symptom of commencing general paralysis. No doubt, in this case, as sometimes occurs, its effect was accumulative. Dr. Lander Brunton, in his valuable work on Pharmacology, thus describes the effect of large doses of this medicine: "The chief symptoms are, however, impairment of the functions of the spinal cord and brain; there is a great diminution of reflex action, so that touching the pharynx no longer produces any tendency to vomit even though the touch itself be felt (anæsthesia is produced by moderate doses in a few weeks), there is drowsiness and heaviness, a great inclination to sleep, and insen-

sibility to outward impressions, the memory is impaired, the speech becomes hesitating and articulation imperfect, the intellect is less clear, the genital functions are much diminished, the gait becomes tottering and unsteady and the muscles weak." Now, these symptoms individually and collectively point in the direction of a lowered nervous vigour, and although they owe their intensity to the fulness of the dose, yet it is clear that, *pari passu*, similar results, though less severe, will be produced by smaller quantities. It is interesting to note how similar are the effects produced by continued epileptic seizures and by the action of bromides in full doses; indeed, the symptoms which result are identical. In both cases the nervous force is so much lowered, and its tension so relaxed that no convulsion can take place until sufficient time has elapsed to restore the lost vigour. But if the view of the etiology of the disease formulated by Dr. Radcliffe and almost all writers on the subject be correct, that the disease is one of nervous exhaustion, surely it is evident that the bromide system of treatment, however well it may succeed in palliating and alleviating the disorder, is not one on which we can rely with any hope as a curative measure. To put the whole matter concisely, Epilepsy is a disease resulting from nervous debility, bromides lower nervous vitality, *ergo* bromides, though they temporarily lessen the number of seizures, do not tend to the cure of the disease.

To turn now to the second point which I have advanced as an objection to this mode of treatment, viz., that its action is temporary and therefore palliative only. On this point but little difference of opinion will be found among the best authorities: all coincide that the action of bromides, in Epilepsy, is alleviative, not curative. Dr. Gowers* admits "that the action of the bromides is, in the majority of cases, transient and not permanent." Dr. Lander Brunton,† in his *Pharmacology*, says of it: "It is perhaps, however, not so much a curative as an alleviative remedy, and the fits are apt to return when its administration is discontinued." Dr. Sidney Ringer‡ says of its use, "the administration should at times be omitted for a few weeks, or the system becomes accustomed to its presence; it then loses its power over the disease, so that it will not uncommonly happen for the good effects, which have been marked at first, to altogether cease, and for the fits to recur with their old severity and frequency;" but he adds, that if the drug be withheld for a time and again resumed, its influence over the attacks will return. Dr. A. Hughes Bennett§ asks, "Finally, the important question arises, does a prolonged use of the bromides tend towards the eradication of the disease itself and the ultimate cure of the epileptic

* Dr. Gowers, "Epilepsy," p. 252.

† Dr. Lander Brunton, "Pharmacology, Therapeutics," etc., p. 347.

‡ Dr. Sidney Ringer, "Handbook of Therapeutics," p. 150.

§ Dr. A. Hughes Bennett, "Epilepsy and Its Treatment," p. 46.

state?" On this point he adds, "I have no personal statistical evidence to offer, nor am I aware of the existence of any sufficiently scientific series of data to settle the question." Surely the test of over thirty years' experience of its action would have established the fact of its possessing a curative influence had it existed; but as a fact, I doubt if the views of the profession as to the curability of Epilepsy have been to any extent modified since the introduction of this method of treatment. Dr. Russell Reynolds,* writing, it is true, many years ago, says, "Bromide of potassium was strongly recommended by Sir Charles Locock in those cases of Epilepsy where the attacks recurred only at the menstrual periods; such cases are not of frequent occurrence, though it is common enough to meet with women whose fits are more numerous during or just before the catamenial discharge. In the latter class I have tried bromide of potassium and carried it on until the menses have ceased, but have noticed no diminution of attacks." Since this was written, no doubt, the use of this medicine has been much extended and its efficacy as an alleviative much better understood. It would be altogether superfluous to extend the quotations which might be made in this direction.

With regard to the third proposition, that the action of the bromides is so entirely opposed to

* Dr. Russell Reynolds, "Epilepsy," p. 332.

what is really required, if we wish to cure the disease, instead of merely postponing and lengthening the interval of attack, and that its use hinders and prevents rather than aids the normal tendency to recovery: these points are so entirely contained in what I have said respecting the two former propositions that I need hardly dilate further upon them. But it will be necessary to offer some explanations as to the reasons for the almost universal employment of this medicine in convulsive diseases, nor is the motive far to seek or difficult to explain; it is because by its means you obtain immediate results, you gain a decided, if temporary, cessation of the more terrible phenomena of the disease. To the patient and his friends, and also to the medical attendant, the immediate relief from so terrible a visitation appears as encouraging as it is wonderful; it naturally begets a hope that a drug which evidently influences the prominent activity of the symptoms so distinctly, must be found ultimately to abolish the disease altogether. The constant suspense and enforced watchfulness, which is always dreading and yet anticipating one of those terrible sudden visitations, induces a ready faith in any measures which promise relief from conditions so depressing. It is not until the fits return, at longer intervals it is true, but often with their old severity, and that the patient is found to be losing ground so far as bodily and mental strength are concerned, that any doubt begins to

arise in the minds of the patient and his friends as to the real actual efficacy of the medicine; and even when the purely palliative action of the remedy has become manifest, it cannot be considered surprising that the patient still clings to the only measure which seems to promise hope of even alleviation in default of any definitely curative method. No doubt, much the same feeling directs the practice of the medical attendant: he uses the bromide treatment for the simple reason that it offers more ready and more complete relief than any other known, or at any rate established, scheme of treatment. Bewildered by the multitude of drugs which have been vaunted as specifics, to be in time cast on one side as useless, and finding no developed system founded on correct or definite views of the causes of the disease, what wonder if he continues to employ means which, at any rate, alleviate the more acute symptoms.

It will be seen, by what I have already said, how thoroughly I appreciate the value of bromide as a palliative; so far, its virtues are thoroughly established, but I believe that much harm has been done by its universal use, in excluding what, I hope to show, is a really curative process founded not on empiricism but on a rational appreciation of the causes of the disease both ultimate and proximate. With regard to the bromides, I would limit their use to those cases in which it is necessary to gain time for the adoption of a tonic plan of treatment, and

would only give them in such doses and with such frequency as would enable such a plan to be carried out. It is evident that this method will, in many cases, demand a prolonged course of treatment; but it must never be forgotten that it means a permanent cure, not temporary relief. More especially is ample time demanded in all cases in which there exists hereditary deficiency of control, for here the nervous asthenia is not that of the individual, but a defect of constitution extending possibly over many generations. In many cases, it is true, a tonic plan of treatment is rewarded with complete and almost immediate success, and one of the many convincing proofs of the correctness of the line of therapeutics which I advocate, is to be found in the fact that the first effects of tonics, even when given in full tonic doses—a system which I altogether deprecate, is to greatly improve the physical and mental vigour and produce a confidence of returning health; and if we had only to deal with the asthenic state of the nervous system, our results would be immediately and almost universally successful. But the important factor of the abnormal excitability and hyper-æsthesia of the nervous centres has to be considered and obviated. It is true that this will diminish and disappear as the nervous constitution is gradually built up, but the main difficulties are confined to the first steps; how to increase strength, without stimulating the convulsive centres

into over-action, is the problem. A patient treated with bromides never loses his cachetic epileptic look; whereas the effect of the tonic course is gradually to restore the lost vigour which manifests itself in the improved condition both of mind and body, so that the patient shows that he is cured, not only by the cessation of the attacks but by his restored healthiness of aspect. The question will naturally be asked, has no one ever recognised the fact that Epilepsy takes its origin from debilitating causes and endeavoured to cure the disease by restoring the lost nervous tone; and if such efforts have been made, how is it that they have failed to attain their object? The answers to these queries are not difficult to give. No doubt the true cause of the disease has been very generally correctly diagnosed; indeed, we have seen that it is so. The want of success of any system of treatment, which has been formed in accordance with the true etiology of the disease, has been, as I have already pointed out, due to the adoption of too active tonic measures, in place of those which, while they nourish and increase the general nerve force, at the same time lessen the hyper-æsthesia of the convulsive centres. Before proceeding further, it will be wise to examine the various schemes of treatment which have at various times been in fashion; and in doing so, I hope to be able to show that those which have met with the largest measures of success have been more or less of a tonic nature.

CHAPTER V.

BEFORE explaining in detail the principles upon which I have for thirty years been guided in the treatment of Epilepsy, it will be well to examine carefully the results obtained by others in the past and at the present, but more especially in the pre-bromide era, ascertaining the nature and action of the medicines which have met with the greatest success, and noting whether the tonic or the lowering methods were the more successful. In doing this I may safely pass by the period of superstitious darkness during which this, and indeed the majority of diseases were treated by compounds the most nauseous and disgusting that imagination could devise; nor would it be serviceable to dwell long upon that succeeding interval during which all disorders, but especially those of a convulsive nature, were looked upon as having inflammatory origin, and were therefore treated by bleeding, antimony, mercury, and other depletory measures; for as a matter of course the marked want of success which attended these methods soon led to its abandonment. During

the period which followed, and until the introduction of the bromides, now some five and thirty years since, the disease appears to have been treated upon no very sound etiological principles, yet it is possible that, by examining the therapeutics of this time, we may be able to throw some useful light upon the subject in question.

Of the number of drugs which have been in turn vaunted as specific in the treatment of Epilepsy, the following would appear to be the most prominent: the salts of zinc, iron, copper, arsenic, silver, quinine, belladonna, digitalis, strychnia, turpentine, naphtha, opium, indigo, aether, camphor, mistletoe. From this list we may, I think, safely eliminate all but the first ten, as sufficient proof exists of the inefficiency of the others. And in considering these ten remedies we shall find that the action of the majority, certainly of those which have been most successfully used, is decidedly tonic, and consequently they have been retained in most of the works which treat of the therapeutics of the disease. Thus:—

NERVINE TONICS.

Zinc, Sulphate or Lactate.	Digitalis, cardiac tonic.
Copper Sulphate.	Cod-liver oil.
Iron in various forms.	Silver.
Arsenic.	Belladonna or Atropine.
Quinine.	Turpentine.
Strychnia or Nux Vomica.	

I propose to consider these remedies seriatim, to

show their action, and quote the views of the best authorities as to their remedial effects. Dr. Lander Brunton says of zinc: "In small doses, zinc salts act as nervine tonics." Dr. Gowers says of its action in Epilepsy: "Zinc unquestionably deserves some of the repute which it has enjoyed, for more than a hundred years, as a remedy for Epilepsy." "It very commonly lessens the frequency of attacks." "In a few cases in which bromide fails to do good, zinc is useful." He, however, much prefers bromides, but gives several cases in which these salts proved beneficial. Zinc was principally advocated by M. Herpin, who gave it in rapidly increasing doses. Dr. Radcliffe has analysed several of his cases with the result of being but ill satisfied with the action of the drug; indeed, M. Herpin himself, after a time, somewhat discarded zinc in favour of copper salts. Dr. Russell Reynolds, after quoting several unfavourable views of its action, says of it: "Notwithstanding these unfavourable opinions, I believe that it is a valuable medicine, not for the cure of Epilepsy, but for the relief or removal of some of its complications." Professor Van der Kolk states that, when given in large doses, after the method of M. Herpin, he has seen benefit from its use, and attributes its favourable action to its sedative properties. Dr. Sieveking says: "Of zinc I would speak very favourably, though by no means with the confidence of M. Herpin. I have satisfied myself

again and again that it exercises a distinct influence on the epileptic paroxysm, often inducing an entire cessation, though frequently only causing a postponement of the attack." Of zinc I have myself no experience, but I should consider it likely that any beneficial action which has resulted from its use has been due to its action as a nervine tonic; its insolubility may afford some reason for its better action in large doses. The salts of copper would appear to have an action very similar to those of zinc; in small doses they act, I believe, as tonics; in large quantities their effect is possibly to lessen the irritability of the terminal branches of the nerves supplying the stomach and intestines, in the same way as nitrate of silver. Dr. Lander Brunton says of the sulphate: "Small doses absorbed into the blood appear to have a tonic action on some parts of the nervous system, and to exert an astringent action on mucous membranes." Van der Kolk describes it as "an excellent tonic in weakness of the bowels, exciting the appetite, promoting the digestion," but he has used it but little in Epilepsy. Dr. Sieveking "can say nothing in favour of copper or its salts." M. Herpin latterly abandoned zinc for copper in the treatment of the Epilepsy of adults; his recorded cases are unsatisfactory. Dr. Radcliffe says, "nor do I know of anything thoroughly satisfactory in the experience of others." He had given it then himself but little. Dr. Allan Hamilton mentions neither zinc

nor copper in his list of remedies; and Dr. Gowers reports unfavourably of the latter; he says, "From nitrate of silver and sulphate of copper, remedies which in the past enjoyed a high repute, I have seen, in the few cases in which I have tried them, no resulting benefit." Concerning iron much more is to be said, and most writers speak favourably of its action. Its use should, however, be confined more especially to anæmic cases; it should be given continuously in small doses, and after the bowels have been thoroughly cleared by some aperient; the action of the liver should also be attended to. I have also seen very good effects from its use in cases where seminal losses were apparently connected with the cause of the Epilepsy. Of iron Dr Watson says, "of all of the metallic remedies, I prefer some preparation of zinc or iron; and Dr. Radcliffe, who quotes this opinion, predicts that the latter will ultimately supplant the former in the treatment of the disease. He continues: "I may say, without hesitation, that I have used iron as a fundamental element of treatment, during the last seven or eight years, and that I have never seen the least evidence of harm from such a practice, on the contrary, I have often found unequivocal improvement of the general health as unequivocal amelioration in the fits, under a course of iron." Dr. Sieveking's views, which clearly indicate his approval of a tonic system of treatment in general, are strongly in favour of

iron, though he prefers the vegetable salts. "The remedies," he says, "most in repute in the treatment of Epilepsy, are those which are commonly classed together as tonics, and among them we find especially the mineral tonics to deserve and hold a high rank. I should be disposed to place the preparations of iron and zinc first, as those which have done the most service." Dr. Russell Reynolds's views of the action of this tonic are that, although it may be beneficial in improving the general health, it has no effect on the actual disease. If, however, the almost unanimous opinion be correct, that Epilepsy is a disease of nervous exhaustion, surely, any medicine which improves the general constitutional power must have a beneficial effect, and this is further established by the above-quoted views of different authors as to the action of tonics. I may remark that, in my experience, iron is well borne and undoubtedly acts favourably in Epilepsy, but it must, as is the case with all tonics, be given in very small doses and only in appropriate cases, such as when anæmia exists.

The attempt to build up the system rapidly, by giving in Epilepsy doses which would be easily borne under other conditions, possibly accounts for the fact that iron has been discarded as a dangerous medicine by some physicians—Dr. Brown Sequard and Dr. Hughlings Jackson among others; for, undoubtedly, the key to the treatment of Epilepsy on

tonic principles is to be found in the recognition of the extreme irritability and hyper-æsthesia of the nervous state. Though almost all writers recognise the necessity for the reinforcement of the system, and deprecate lowering measures, yet all have failed to carry out a successful scheme of tonic treatment through endeavouring to restore, by active and rapid measures, nervous deficiencies which are the result of exhausting conditions spread over a great length of time, or the outcome of a gradually intensifying hereditary influence descending from generation to generation. With regard to the action of iron, Dr. Gowers's views are pronouncedly favourable: "In rare cases," he says, "it does increase the frequency of the attacks; in the majority of cases it may be taken without any ill effects on the attacks, and often with all the benefit to the general health which attends its use in other cases. In some cases its influence on the attacks is distinctly beneficial." Arsenic, again, is a nervine tonic which is often most useful in the treatment of these cases. Dr. Gowers did not find it effective, though he has given it largely with the object of alleviating the bromide rash. This combination of the metal with the potash salts would probably explain the inaction of the arsenic as a nervine tonic. Dr. Clapton, in an excellent article on the action of quinine, more especially with regard to its influence on Epilepsy, thus speaks of arsenic: "In Epilepsy, as in ague,

arsenic seems to have a very decided influence in lessening the severity and frequency of the paroxysms and improving the general health. I have not very often prescribed it among the hospital out-patients, though I have each time found it very beneficial. As a nervine tonic and anti-convulsive it is superior to zinc, no doubt because, as in ague, it acts by its power of preserving animal substance, and so preventing the waste of animal quinoidine. The few patients whom I treated with arsenic improved in general health more rapidly than those treated by other tonics; and in the published report of the in-patients treated at this hospital (St. Thomas's) from 1861 to 1865, I find that the average stay in the hospital of those cases treated mainly by arsenic was twenty-five days, whereas the average stay of those treated mainly by zinc was 58·4 days." Dr. Allan Hamilton also speaks of it as "excellent both for its anti-periodic and alterative action."

We now come to nitrate of silver, a medicine formerly much in vogue, and pushed to great extremes. It has now been virtually discarded, though it has, I believe, its uses. A prominent exciting cause, in many cases of Epilepsy, is the extreme irritability of the peripheræ of nerves in the mucous coats of the stomach and intestines, so that attacks constantly arise from irritations which manifestly take their origin from these mucous surfaces. Now, if in these cases we can so far deaden the

hyper-æsthesia of these surfaces, we have, for a time at any rate, lessened the liability to attack. I believe that the action of the salts of zinc and copper owes its efficiency to somewhat similar reasons. This action of the nitrate of silver has been pointed out by Professor Van der Kolk, though he had never succeeded in curing a patient by its use. I am unable to find any others who advocate its use in the present day.

Of quinine, on the contrary, many writers speak well. Dr. Radcliffe* is strongly in its favour: "It has been used," he says, "by more than one writer, by Rostan and Piorry among the rest, and cases are on record in which the disease is supposed to have been cured, and for myself I have used it almost promiscuously, and scarcely ever, if ever, without benefit." In his excellent article, just quoted, on quinine, in the new series of St. Thomas's Hospital Reports,† by my friend Dr. Clapton, he gives some particulars of the treatment of seventy cases of Epilepsy by quinine, in many of which the most excellent results were obtained. In analysing these cases, 69 in number (for one was found to be an impostor), the result shows that 16 were cured, 26 relieved to a greater or less extent, 27 were unrelieved. In the majority of these cases, quinine was given in conjunction with other drugs ;

* Dr. Radcliffe, "Epilepsy," p. 194.

† St. Thomas's Hospital, "New Series," Vol. I, p. 229.

still, as Dr. Radcliffe remarks on the value of similar combinations, some of the credit is probably due to the quinine. Dr. Clapton lays especial stress on the useful action of the alkaloid in those cases of Epilepsy which appeared to be due to the exhausting influence of malaria on the nervous constitution. In these cases considerable doses of the drug were given, and its *modus operandi* may be explained by the fact that, in large doses it lessens reflex action and also probably depresses the vasomotor centre, thus diminishing arterial tension and cutting short the seizure. In these cases, no doubt, more immediate effects would be produced, though more lasting results would unquestionably follow its exhibition in small, long-continued doses. My own experience of this remedy is not large, as I have usually preferred strychnia, or nux vomica, which have similar effects to quinine when given in small doses.

The next medicine of which I have to speak is belladonna. Professor Van der Kolk advocates its use, and attributes its favourable action to the effect it has in lowering the extreme sensibility of the sympathetic nerves, though he admits that he has never succeeded in curing a case by this remedy alone. Dr. Gowers looks upon it as rarely useful alone, but unquestionably serviceable with other remedies, more especially bromides. Its action in cases of *petit mal* is probably due to its effect on the vasomotor centre. I have met with marked success with it

in several of that peculiar form of attack which Dr. Hughlings Jackson has designated "dreamy states." Dr. Sieveking, in like manner, regards its action in combination with other drugs as distinctly useful, and attributes its efficacy chiefly to the fact that it allays the "irritable condition of the organs more immediately under the control of the sympathetic system," thus clearly coinciding with Van der Kolk. Eccheveria, in his work on Epilepsy, says of Belladonna, Atropine, and Valerianate of Atropine: "None of these substances act in any specific manner on the nervous system." Dr. Russell Reynolds does not speak strongly in favour of this medicine, which he has never been able to credit with anything like permanent cure, though patients often express relief after taking it. He has not tried it in the form of the alkaloid. The evidence is, then, I think, in favour of belladonna producing, in some cases, a certain amount of alleviation in Epilepsy, but that as a curative means it is not ordinarily successful. Digitalis I have often found extremely useful in Epilepsy, more especially in cases where the heart's action has been rapid and weak; it acts probably by toning the muscular action of the heart and regulating the cerebral circulation, and thus improving nutrition; it has a marked effect in lessening mental depression; its efficacy is, I find, greater when given in small doses. Dr. Gowers says of it: "Given alone I have not found its power to be con-

siderable." Its use, he remarks, is clearly inadmissible in cases of aortic regurgitation with hypertrophy. He considers it chiefly serviceable when given in combination with bromides. Dr. Hammond, of New York, says, that in his hands it has never produced the slightest result. Still I have myself seen so frequent and so decided benefit from its use in a certain class of cases that I am confident that it does relieve some of the conditions which are apt to accompany the disease. Indeed, the fact of its having retained its place in the therapeutics of Epilepsy is sufficient evidence of its utility. Van der Kolk who, following a rational train of reasoning, endeavoured by the use of digitalis to moderate the vascularity, and by this means lessen the excitability, of the nervous centres met with some encouragement from its use. He prefers the infusion to any other preparation. In my view the favourable action of the medicine is more due to its action as a cardiac tonic, as it ensures a more regular and steady cerebral circulation.

Cod-liver oil is a remedy in which I place the greatest confidence, as it fulfils directly the main object of treatment by nourishing, without stimulating, the excitable nervous centres. I use it almost invariably with young people, and in all cases where the extreme prostration of the nervous constitution has induced a more than ordinary measure of irritability. It naturally requires some con-

siderable period of time for its action. Dr. Ainstie cured seven out of twenty epileptic patients with this remedy alone. Dr. Allan Hamilton says: "I am confident that it is a valuable remedy, which is not appreciated as it should be; I have witnessed its great virtues when the bromide cachexia was profound. Eccheveria is loud in its praises, and considers that it "ranks ahead of nervine tonics"; it has, he says, been administered freely in most of his cases. "I look upon it as one of the most valuable remedies, though not prescribed so frequently as it should be in Epilepsy." Dr. Sieveking also strongly advocates its use, and recommends that it should be often combined with iron. Neither Dr. Russell Reynolds nor Dr. Gowers mentions it.

I now come to *nux vomica* and its alkaloid strychnia, and these remedies demand more lengthened consideration, as it is mainly by their means that I have been combating this disease for nearly thirty years. I will quote an extract from one of my earliest books, which will show the manner in which I was first led to make a trial of this remedy in Epilepsy. "Any one who refers to Professor Van der Kolk's work, on the medulla oblongata and Epilepsy,* will find the following passage. After stating the cause of the disease to consist in an exalted sensibility of the medulla oblongata, he goes

* Van der Kolk, "On the Medulla Oblongata," p. 258.

on to say : 'We are aware that strychnia exalts the capacity for reflex action to an extraordinary degree, and gives rise to spasms and finally to violent convulsions. Now it is well known that if we give strychnia to animals, and afterwards administer conia, these convulsions cease. I flattered myself, therefore, that a small dose of conia should diminish the reflex capacity for Epilepsy, and that I should thus have found a means of directly removing the proximate cause of the disease. I now gave this remedy (conia) to three epileptics of long standing (among whom was an unmarried woman aged 30), who were all attacked every eight or eleven days, sometimes at longer, sometimes at shorter intervals, with violent epileptic fits, and with whom I had already in vain tried several remedies. I prescribed a thirtieth of a grain of conia three times a day. So early, however, as on the second and third days I was obliged to give up this medicine, as in all these patients the attacks were increased so much in severity and number that several violent fits occurred in one day. I saw that the reflex action was not diminished, but exalted by the drug, and that I had tried a most injurious medicine in Epilepsy.' Now, what inference is to be drawn from the facts here stated? Why, I think it is very plain, strychnia in large doses causes convulsions which conia relieves, but conia in Epilepsy most decidedly aggravates the attacks. What then more rational than to look

to its antagonistic strychnine to give the required tone to the convulsive centres, and thus to relieve the disorder." Since these words were written, now very many years ago, experience has confirmed in the most positive manner the truth of the deduction which I then drew from Professor Van der Kolk's facts. The reasoning may seem paradoxical, in the face of the undoubted fact that strychnine increases the capacity for reflex action, and that, as I have shown, the nervous condition in the epileptic is already, from its debility and exhaustion, hyper-sensitive and irritable, and therefore liable to explode on the occurrence of slight stimuli. But the solution of the problem is not far to seek. We see that with many remedies, probably with most, the strength of the dose determines the action; thus, a large dose of opium will produce sleep and unconsciousness, while a small dose stimulates the mental faculties to the highest pitch; in like manner a large dose of ipecacuanha produces vomiting, a very small dose checks it; so it is with nux vomica: in minute doses it acts as a nutrient, in rather fuller doses as a tonic, in considerable quantity as a stimulant of nervous force. Now there are certain cases of Epilepsy where the nervous exhaustion, and consequently the accompanying irritability, are not extreme, in which tonic doses of nux vomica may be given with the most immediate and excellent effects, but in the majority of cases, especially when

the disease has existed for some length of time, only highly attenuated doses can be borne, and in many of these it is necessary at first either to combine it with, or give it at the same time, as bromide. No doubt, Marshall Hall was on the right track when he advocated the very small doses of strychnia; his only mistake was that he did not make them small enough. In this relation Dr. Radcliffe remarks upon Dr. Marshall Hall's use of strychnine thus: "Strychnia, as all know, was a very favourite remedy with the late Dr. Marshall Hall, but the dose was attenuated to such a degree as to render it somewhat difficult to believe that much good came from it; Dr. Hall, indeed, virtually allows that harm was done if the dose was sufficient to produce the physiological effects of the drug." He says, "I believe it has been generally given in a dose which is stimulant, and therefore injurious." To precisely this opinion my own experience has also led me, and I think it will be found to coincide perfectly with what we can learn of the action of this medicine from other sources. Thus Dr. Lander Brunton* says, regarding the action of strychnine, that "both the normal tone and the reflex excitability of the vasomotor centre are greatly increased by strychnia." Again, Michael Foster† states that the effect of this alkaloid is to delay, but not to

* "Pharmacology, Therapeutics, Materia Medica," p. 246.

† "Text Book of Physiology," p. 539.

diminish, the effects of reflex action by exciting the inhibitory action of the centres at the base of the brain, in all probability the optic lobes. He says: "When a frog is poisoned with small doses of strychnia, the reflex movements caused by a very slight stimulus may be very great, but the period of incubation may be the same as that of a frog in a normal condition; when the dose is increased, the period, instead of being diminished, is increased, the increase being very considerable when minimum stimuli are employed, but much less marked with strong stimuli." The only fact which we learn from these experiments is, that large doses of strychnine in frogs retard reflex action, and observation tends to show that similar results attend the use of large doses of both strychnine and quinine in man; but we learn nothing as to the action of long-continued minute doses of the far less stimulating *nux vomica*. We attain temporarily the same effect by the action of bromides, which numb into inactivity the excitable centres; but clearly our object should be to restore lost power and strengthen deficient control by more thoroughly nourishing the nervous constitution, not by paralysing its over-activity for the time only.

Many medical men, besides Dr. Marshall Hall, have observed much benefit from the use of strychnine and *nux vomica* in Epilepsy. Dr. Allan Hamilton* strongly advocates its use, though he

* "Nervous Diseases," p. 333.

is incorrect in giving me the sole credit of its introduction; he says of it, "in small doses it certainly does good." Dr. Hammond* also speaks most favourably of its effect in Epilepsy, though he usually administers it in conjunction with bromides, for which plan, in certain cases, much may be said. I propose, however, to give his own statement of results in his own words; he says, "With the bromides I generally administer strychnia in doses of the thirty-second to the thirty-fourth of a grain, for the purpose of a tonic, and for counteracting to some extent the debilitation produced by the bromides." His summary of cases is as follows: "Of the two hundred and eighty-six cases in which the bromide was administered, the seizures were entirely arrested or lessened in frequency and severity in two hundred and forty-three, while in forty-three it was either positively injurious or without effect." These statistics no doubt exceed in their favourable results those of either Dr. Gowers or Dr. A. Hughes Bennett, and with all three a large amount of uncertainty must naturally exist; for the large majority of cases did not, in all probability, remain sufficiently long under treatment to enable the observers to determine how far the effects were palliative only; and I am quite ready to concede that such results may be obtained by the exhibition of bromides in almost all cases for a

* Dr. Hammond (New York), "Diseases of Nervous System," p. 585.

longer or shorter period. Still, the fact that Dr. Hammond found advantage from the combination of so powerful a tonic as strychnine with bromides seems to me a step in the right direction. With regard to the future, and taking note only of cases cured, I do not fear the comparison of the tonic, or rather nutrient system of treatment, with any other. I cannot resist making one more quotation from Dr. Hammond's book. He says: "Five of these unsuccessful cases were afterwards treated with other remedies, one was cured by the lactate of zinc, one by changing the time for sleeping, and three by strychnia in small doses, as recommended by Mr. Tyrrell." Dr. C. Handfield Jones* also speaks very highly of the action of strychnia in the treatment of enfeebled conditions of the nervous system. "Strychnia," he says, "I have come to regard as an extremely valuable cerebral toner, its action on the encephalic being not far inferior to that which it exerts on the spinal centres; it is a perfectly safe remedy with due care, and, although I have employed it for years very largely, I have never seen more than slight inconvenience produced by it, when it disagreed with some patients of unusual susceptibility." Almost all the writers I have quoted are giving their experience of strychnine, which was the form in which I originally administered the

* "Clinical Observations on Functional Disorders," C. Handfield Jones,
p. 123.

medicine; but later experience, which has to some extent modified my views of treatment, has shown me that *nux vomica* is, in the large majority of cases, a far safer and more effectual method of administration, and even in this less active preparation it has to be kept within very moderate limits. Indeed, in certain cases, which are marked by extensive irritability, the smallest doses have to be administered, and it is often necessary to couple with its exhibition some form of local counter-irritation, or to set up some derivative action. There are two forms of Epilepsy in which strychnine should rarely, if ever, be given; and when it is used the greatest caution should attend its exhibition. The first class of cases is that in which the disease has existed so long and with so great violence that it is almost certain that structural changes of greater or less importance must have occurred in or about the convulsive centres. In such cases it is only natural to suppose that any attempt to tone or build up the nervous system would simply increase the number of seizures, which are kept up not so much by the unstable condition of the nerve cells as by the positive irritation of an existent lesion. But even in severe cases it is not always certain that such structural change has taken place, so that a trial of the strengthening system should always be made. The following case, quoted by Dr. Clapton in his paper already referred to, and which I quote

at length, is evidence of this. "Case 42, F., aged 29; fits 20 years; vacant look, with widely-dilated pupils; under treatment two years; fits very frequent; twice only had she sufficiently long warning to take five grains of quinine, which each time prevented the fit. Eventually the fits were completely cured (at least so long as she was under observation) by Mr. Walter Tyrrell's plan of treatment, by strychnia." The second class of cases in which I hold that my method of treatment is inapplicable, is that in which there is present some form of mechanical irritation, either a bony tumour pressing on the meninges, or a clot or tumour in or about the brain itself. In such cases the attacks arise from the severity of the irritation overwhelming the natural resistance and power of the centres and forcing on convulsions.

We come now to the subject of dose. Dr. Marshall Hall gave strychnine, and usually recommended it in doses of the fiftieth part of a grain; and many cases are to be found which will bear this dose well, but in the large majority it will be found too great. Indeed, as I have already said, I prefer the use of *nux vomica* in the form of extract or tincture, and even with this I have often to commence with doses of the two-hundredth part of a grain. That extremely minute doses do exercise a powerful nutrient effect, if persevered with, is positive; and a generation which accepts with faith the use of drop

doses of ipecacuanha as a remedy for certain forms of vomiting, and the extremely attenuated doses of sulphide of calcium, can scarcely with consistency refuse to make trial of even more minute doses of so powerful a remedy as nux vomica. Indeed, Dr. Ringer recommends, in certain forms of gastric derangement, the use of single drop doses of the tincture to be given at frequent intervals.

The last remedy on the list is turpentine, of which Dr. Watson speaks as follows: "If I were called upon to name any single drug, from which, in ordinary cases of Epilepsy, I should most hope for relief, I should say it was the oil of turpentine, and I find that other physicians have come to the same conclusion. Dr. Latham, the elder, was, I believe, the first person who made known its efficacy in this disorder. Foville states that he has seen excellent effects from it; it is highly spoken of by Dr. Perceval in the 'Dublin Hospital Reports.' It is not to be given in large doses, but in smaller ones frequently repeated; from half a drachm to a drachm every six hours." I have myself noticed the beneficial effects of this medicine in Epilepsy; an examination of its mode of action will, I think, show that better results are to be obtained by the use of measures less nauseous and distressing and more likely to be of permanent service. The chief value of turpentine lies, I believe, in the derivative effect which it produces by stimulating the mucous coats of the

stomach and intestines, and thus withdrawing blood and nervous energy from the excited cerebral centres. Naturally, this effect will only last as long as the stimulating effect of the drug; whereas, if we are content to obtain the same results by a slower but more permanent process, we shall find it possible to re-establish stability on a far more permanent basis by the use of continued massage, combined with the tonic and derivative effect of cold.

Of the other remedies I have mentioned, eight in number, which have at various times been looked upon as more or less specific, I need make no separate mention. I have had but little experience of their action in my own practice, and the fact that they have, almost without exception, gone completely out of use proves their inefficiency. I would, however, say a few words in favour of minute doses of opium in the treatment of some cases of Epilepsy. In those cases arising from exhausting causes in elderly people, or in those who from extreme alcoholic excesses have rapidly lowered their nervous vitality, I have found excellent results from the administration of one or two-drop doses of tincture of opium given at frequent intervals; it acts as a powerful toner and often relieves the sickness which is liable to occur in such cases. In explaining my own system of treatment for Epilepsy, it will be as well to recapitulate briefly a few of the points which I have endeavoured to prove in the foregoing pages,

so that it may be seen how far my views are based on reason.

My propositions then are:—

1st. That Epilepsy results from exhaustion of the nervous system, either hereditary or induced, more often the former.

2nd. That beyond the asthenic state of the nervous system, there is also generally extreme irritability and excitability of the nervous centres.

3rd. That the main object of treatment is to build up and restore the tone of the nervous system.

4th. That the secondary object of treatment is to lessen the nervous excitability which is the outcome of the debility.

Now, it is clear that the main difficulty lies in strengthening the nervous condition generally, without at the same time over-stimulating the hyper-sensitive centres. To effect this we must find, in the first place, remedies which have the power of increasing nervous tone without increasing nervous excitement; or, secondly, that lower the hyper-æsthesia while they increase the general power; or, thirdly, we must adopt some measures which will lower the excitability of the nervous centres so as to permit a gain of general nervous force without any increase of irritability. With regard to the first of these projects: there are several remedies to which we may look in order to effect our object, and first among these I would mention *nux vomica*, re-

membering that, in the large majority of cases, the dose must be so far attenuated that it may never act as a nervine stimulant, indeed in most cases scarcely as a tonic. Another remedy upon which I place very great reliance as nourishing, without in any degree increasing excitability, is *avena sativa* in the form of concentrated tincture. This preparation, which is one of the many valuable remedies which we owe to American discrimination, I have now used for some years with very excellent results. I have already referred to my belief in cod liver oil as a curative agent in Epilepsy, and it will be found that many practical observers coincide in this opinion. It is especially useful in the treatment of children, and in those cases in which the disease is accompanied by an unusual degree of hyper-æsthesia, as it is solely nutrient in its action.

With regard to the second class of remedies, viz., those which, while supplying tone, at the same time lower excitability, such remedies are difficult to find; the one which most completely effects these objects being cocaine. I have used this drug both in the form of coca tincture, coca wine, and also in its most powerful form of the alkaloid cocaine. It undoubtedly fulfils the purpose which I have described, viz., of lessening the hyper-æsthesia; but I am not so confident of its permanent effect as a nourisher of nerve force; it also, unless carefully given after food, is apt to interfere with the appetite.

With regard to the possibility of defining any particular remedy as being adapted to any particular form of Epilepsy, I am inclined to think that it is far better to be guided by the general state of the patient, that is to say, to ascertain to what extent his nervous vitality has been lowered, whether the deficiency is an hereditary failing, or the product of exhausting causes to which the patient himself has been submitted ; and if so, to what extent it is coupled with irritability and abnormal excitability to reflex action. Then again, the age of the patient and his general surroundings, both mental and physical, have to be considered. This will probably be found a more successful plan than to endeavour to treat each case by the special symptoms which it may present. For though the symptoms presented by the disease are alike in no two instances, and although the exhaustion and consequent irritability of nervous force may manifest themselves in every variety of unstable action, yet the same principle of treatment will be found to apply uniformly to every variety ; if you can only succeed in bringing the tone of the cerebral centres up to a normal standard, the symptoms of disease will subside.

The vast improvement in general health, which attends the re-establishment of the strength of the nervous constitution, offers in itself a sure token that your patient is cured ; whereas, however long and complete may be the immunity from attack

afforded by bromides, the patient never loses the epileptic cachexia, but carries in his depressed mental and physical condition, in his dulled complexion and clammy skin, the outward and visible signs of his disease.

I would make one exception to the general remarks which I have made with regard to the treatment of certain cases of *petit mal*, and of those curious seizures which Dr. Hughlings Jackson has called "dreamy states," in many of which it would appear probable that the sympathetic system is deeply implicated; here I have found belladonna and atropine to be undoubtedly of great service, though their *modus operandi* is not by any means intelligible, at any rate so far as my experience goes.

An extremely strict attention to diet is also of the greatest importance in these varieties of the disorder; indeed, the treatment of the epileptic should by no means be confined to the use of medicinal means, which form but a small part of the general scheme of treatment. For, in the first place, as I have already pointed out, the mental aspect of the patient must be strengthened, and his moral sense invigorated at the same time that the physical nervous tone is being raised. The first step towards this achievement should be made by separating the patient from any unhealthy environment, and placing him in a position where his mental confidence will be developed and where

his surroundings will be of a healthy and tonic nature. His attention should, as far as possible, be withdrawn from himself and his ailments, and the current of his thoughts turned generally into healthy and pleasant channels.

Physically, much is to be gained by placing the patient in a bracing tonic climate. I constantly notice the good effect produced by removing epileptics from a damp depressing situation into a dry, cold, mountain air. Once placed under these favourable circumstances, it is best to lay down a systematic course of treatment. On rising, the hour for which will vary with the nature of the case, the attendant should commence the day's treatment with the bath, in which cold water is to be applied, so as to obtain the greatest amount of derivative action: in a few words the test of the value of the cold bath lies in the amount of reaction which it produces. In many cases of delicate women and fragile anæmic children it is wise to allow the patient to stand in hot or tepid water, and the amount of cold which is applied to the spine, from the neck downwards, should be regulated by the temperature of the air, and by the ascertained amount of reaction. The bath over, the patient should be thoroughly dried, and placed between blankets, while the feet and legs are rubbed, or massage is applied, until not only is the skin thoroughly stimulated, but every muscle and tendon

has been exercised. The bath and rubbing should be again used at night, and in some cases it is wise to administer a third application of massage, in the middle of the day, without cold water.

The subject of diet should exercise our greatest care and watchfulness; for as, owing to the debilitating causes which give rise to the disease, no organ receives its proper supply of nerve force, both stomach and liver are necessarily defective in their power of function; for this reason all the *ingesta* should be not only of the most digestible nature, but should consist, as much as possible, of articles calculated to strengthen and nourish the nervous growth. With this combined object, much care is necessary in selecting appropriate food, putting on one side anything which is stimulating or difficult of digestion, and choosing what is nutrient and easily assimilated. In many patients the attacks occur early in the morning, either on first waking or on getting out of bed. I am confident that, in many cases, this is due to exhaustion caused by the long hours of the night being passed without any kind of nourishment having been taken. In several cases, I have been enabled by giving a dose of cod-liver oil the last thing at night, or by the administration of a cup of cocoa, or some slight nourishment early in the morning before rising, not only to avoid the occurrence of the morning paroxysm, but to aid materially in the cure of the disease.

Regarding the enfeebled condition of the digestion, the use of much meat in the diet is not advisable, though in the form of extract or meat essence it may be given three or four times daily; indeed, the principle of little at a time and often should always be followed. At breakfast, which may be taken directly after the morning bath, and prior to the rubbing if desired, milk, eggs, fish, chicken minced with cream or pounded, bread or toast, potted meat, calf's brain in cakes, may be taken with milk and water or cocoa in the way of fluids; at 11 a.m. a little meat extract, or the yolk of an egg beaten up with milk, and, if desired, a tea-spoonful of brandy, or a table-spoonful of port wine, should be given. Dinner should be in the middle of the day, at from 1 to 2 o'clock, and should consist of fish, turtle, the lighter kinds of meat, such as mutton, roast or in chops, or cutlets, chicken or other poultry, game, rabbit, calf's head and brains, well-cooked vegetables, all farinaceous substances made into puddings or otherwise, but always, if possible, in combination with milk, rice, sago, tapioca, arrowroot, macaroni, corn flour, blanc-mange, jelly; for beverage, milk or milk and water; if wine has been taken, some Burgundy or Claret may be given, or a glass of beer if it is found that it can be digested. At 4 p.m. a sandwich of potted-meat, or a little clear soup, or some other light food may be given. The evening meal should be especially light and nutritious, and a

total avoidance of tea and coffee (the latter may be taken weak with plenty of milk in the morning) should be inculcated. The patient should be encouraged to be as much as possible in the open air, but exposure to the heat of the sun is to be avoided, and care must be taken not to carry exercise to fatigue. No reading, or other work which demands an increased cerebral circulation, should be permitted, and all excitement must be forbidden; for this reason it is better that the attendance at public places of amusement, theatres, concerts, balls, and even at church, should be dispensed with; in short, the patient should lead a life of almost entire repose. In some cases electricity, in one or other of its numerous methods of application, will be found of service; but in the earlier stages of treatment it is but rarely advisable, as it is apt to excite, and under any circumstances great care is necessary in selecting the form and its mode of application. So far as regards hygienic treatment; but it must be remembered that as no two cases of Epilepsy present altogether similar features, so to no two cases are similar therapeutic measures throughout applicable. I have forborne to give any definite rules regarding the doses of the medicines which I should employ; indeed, it is manifestly impossible to lay down any precise rules for the treatment of a disease so protean in its shapes and so varied in its symptoms.

In cases where the tendency to congestion of nerve force in the brain generally, and in the convulsive centres more especially, is marked, considerable relief is often given by establishing a direct derivative action by some form of counter-irritation, I usually prefer the use of a seton, either of silk or of gum-elastic tape inserted high up just below the occiput. The good effects of this plan are most marked in those cases where a tendency to plethora exists, where the seizures are violently convulsive, and where the disease has resulted from injury to the skull. I should certainly avoid this method in all cases where the patient is anæmic, and when its lowering effect on that account is to be dreaded. In those cases where an aura commencing in one of the extremities exists, the active use of rubbing, or the local insertion of an issue, is often very effective. In cases where sexual irritation, with or without onanism, is connected with Epilepsy—which, as I have pointed out, is a very common accompaniment of congested states of the medulla oblongata—some form of local counter-irritation often aids recovery, partly by relieving the over-congested centres, and partly possibly by reducing the sexual excitement. In children where this form of excitement manifests itself by constant priapism, circumcision is always advisable, as it certainly lowers the hyper-æsthesia of the parts. Cases of this kind may occur very early in life. I have seen several cases in which this excitable state

of the sexual organs, coupled with Epilepsy, has occurred at two, three, and four years of age. Such cases do well invariably on a tonic course of treatment, in which cod-liver oil should form the main remedy.

Beyond the general law, that the greater the exhaustion the more marked will be the irritability, and that it is wiser in every case to advance from minute doses to larger ones than to risk increasing the abnormal irritability by over-stimulation, it is impossible to say much in the direction of special treatment. That the system which I have described is founded on a rational view of the etiology of the disease will, I think, be generally admitted; that it is successful, I have demonstrated to myself, and many others, in my experience of its workings during the past thirty years. I now leave it in the hands of the profession; and although we are strongly conservative in adherence to what may be termed the beaten tracks of therapeutics, and follow, perhaps, too blindly any popular system, yet I am confident that the day is not far distant when the bromide system of treatment, successfully palliative as it admittedly is, will be finally set aside in favour of a far more rational and definitely curative process. In the following pages, I have made a selection, from my case-books, of a number of cases which have been under my care from time to time. In doing this I have endeavoured to furnish those

which present marked variety of types of Epilepsy. Some have been cured for over twenty years, others are of more recent date; but I have included no case in which any doubt as to the perfect recovery of the patient can possibly be entertained.

CHAPTER VI.

I PROPOSE, in this chapter, to give a few short notes of cases which seem to me to illustrate the efficacy of a tonic plan of treatment when applied to the different forms of Epilepsy. Many of these cases have already been published in previous editions of this work; and although some of the patients date their recovery so far back as 20 years, yet in no case have I met with any serious tendency to relapse.

With regard to the medicines employed, I have steadily adhered to those which I considered most calculated to restore nervous vigour gradually and without stimulation; and this remark applies not only to the medicinal means, but to the general hygienic treatment. In almost all, the tonic use of cold has been found a most efficacious restorative. I have avoided the use of bromides, as far as possible. In some few cases its palliative effect has been necessary in order to gain time for the introduction and employment of the slower nutrient process; but in every case it has been my object to discontinue its use as soon as possible, as it has

always seemed to me that its action was entirely opposed to any rational theory of the origin of the disease.

One of the first cases, in which I carried my views of the treatment of Epilepsy to a successful issue, was that of a young man aged 26, who consulted me early in 1860. He was unmarried, of spare habit, and a moderate liver; he had been for about two years subject to attacks of *petit mal* occurring once or more daily; he could assign no definite cause for their on-coming, but he had been for some time gradually losing flesh and general strength. A few days prior to my seeing him, he had been seized with an attack of convulsive Epilepsy. This was sudden, without warning, and no especial cause could be assigned for its occurrence. His general condition showed great lack of nervous vigour, his pulse was feeble, his skin cold and clammy, and there was marked want of energy. I placed this patient on doses of the $\frac{1}{16}$ of a grain of strychnia, twice daily in solution, and coupled it with a generally tonic system of hygiene, use of cold, friction, etc. From the time of commencement of this plan of treatment he had no further convulsive attack, and his general health rapidly improved. He continued the strychnine for about two months, when the minor seizures had also subsided; and with the exception of one slight tendency to relapse, which yielded readily to the means first employed

(I see this patient still at times), he has continued well and in the active pursuit of his profession to the present date. This case, which was in some respects a favourable one from its recent occurrence, yielded to a fairly large dose of tonic, though since that date I have found reason to modify my views of treatment and greatly to reduce the strength of the doses given in the earlier periods of treatment. In 1863, I saw a child aged 6, who was subject to a severe form of *petit mal*; her health was in other respects good, though she was slightly anæmic, but the attacks which had commenced soon after her birth were very frequent, occurring as often as six or seven times in the day; she would sometimes fall, but without any general convulsion; sometimes she would only lean against any neighbouring object. In some of the severe attacks there was a stiffening of the right arm and hand, with inversion of the thumb. She had undergone almost every plan of treatment, at different periods:—iron, which had a temporarily good effect, valerian, iodide of potassium. After prolonged treatment of a tonic nature, in which strychnine was ultimately given in the dose of $\frac{1}{24}$ of a grain, she entirely recovered, and with one relapse has continued well ever since, having married and borne children.

In the same year I was consulted about a young man aged 26, who had been epileptic for six years; for the last two years his mental powers had greatly

failed. In this case, which owed its origin to continued sexual excess, the general nervous condition was much weakened, and there was partial paralysis of both bladder and lower extremities, which appeared to be rapidly increasing. In consequence of this, and of his mental failure, he had been for some little time in an asylum. In this case the effect of the strychnine was most marked; the attacks gave way entirely, and the paresis was much relieved. The last I heard of him was to the effect that he was living at home quite free from the attacks, and much stronger both in mind and body.

A gentleman aged 38, unmarried, a dull, heavy-looking man, of dark saturnine complexion, had had Epilepsy for two years, his attacks coming on with some irregularity every week or ten days. After commencing strychnia in doses of $\frac{1}{12}$ of a grain, his first interval was ninety-six days, when an indiscretion in diet brought on an attack, which was not repeated.

A young gentleman, aged 20, had suffered from epileptic attacks for four years; they were violently convulsive, and came on at irregular intervals. The general condition of his health was delicate and feeble; there was also a strong hereditary predisposition to nervous disorder. This patient was treated with doses of strychnine of (ultimately) $\frac{1}{12}$ of a grain twice daily, under which the attacks were reduced from an average of one in a fortnight

(though the interval was sometimes two months) to one in four months. As he did not improve in general health so rapidly as I could wish, I recommended a sea-voyage and a continuance of the tonic treatment; under this he rapidly recovered, and when I last heard of him he had been free from attack for over three years.

The following is an interesting case of Epilepsy, originating in alcoholism. A clerk, aged 22, unmarried, had led a very intemperate life; he had had delirium tremens more than once; his heart's action was very irregular and feeble. The fits, which came on with some irregularity about once in the week, were clearly mainly dependent on irregular and defective nutrition of brain acting on a deficient nervous control. In this case I found the combination of small tonic doses of tincture of digitalis with strychnia most useful. He rapidly recovered and had, when I last heard of him, been without any attack for some years.

The following is one of those cases frequently met with, in which the exciting cause is found in menstrual irregularity acting upon an unstable nervous condition. The patient was a strong-looking, full-blooded girl; her attacks almost always occurred in groups at or about the catamenial epoch. She had caught cold while menstruating some four years before she came under my care, since which time she had suffered from the seizures. A completely

successful result attended the use of nervine tonics—strychnia with aloes and myrrh. The patient was quite well five years after.

In August, 1865, I saw a very interesting case; it was, in many respects, one very unfavourable for treatment, as the attacks had come on in infancy, and had gradually increased in intensity and number up to the date at which I saw him, when he was 20 years of age. I will, however, give the notes of the case, as supplied to me by Mr. Swinhoe, of New Swindon, under whose care the patient was. "Thomas F. first had epileptic fits at the age of 13 months, and they have continued at intervals ever since. He has never had less than two or three in the week. First seen by Mr. Tyrrell in August, 1865, at which time he frequently had three fits in a day. He was ordered to take strychnia, which at first made him feel giddy, and twice a fit followed its administration; but by a little management and attention to the bowels it became tolerated, and he has taken it now in small doses for nearly six months. His present condition is as follows: the fits never occur oftener than once in the week, and are now more like attacks of syncope than Epilepsy; in all respects he is in much better health and much more lively and cheerful; in fact, in this extremely unpromising case the strychnia has proved of the utmost benefit." I cannot recall the exact dose of strychnia which I prescribed in this case, but I know

it was a very small one as, from the history of the case, I rather dreaded its effect in any quantity. It must be remembered that my experience of the remedy was at that time comparatively small. The modification in the nature of the attacks was also curious, though by no means uncommon, and it is a change which I am always glad to recognise, as it almost invariably precedes an entire re-establishment of health.

Shortly after this I saw a lady aged 30, unmarried ; she had suffered from Epilepsy for eight years, the attacks occurring every week with tolerable regularity. After commencing the strychnia she had no attack, and I quote a paragraph from a letter I received at that date: "I saw E. H. last week, and had a long talk with her ; she is most decidedly better, and I find she has never had an attack since she took the strychnia, which she is still taking regularly. She is quite cheerful and much more active than she used to be." In this case I could find no very positive indication of any exciting cause ; the credit of cure was undoubtedly due to the tonic system of treatment.

A not unhealthy-looking girl, aged 17, had never menstruated properly ; had been subject to Epilepsy for four years, the interval never being longer than a week ; the attacks varied in intensity. In this case I commenced with the $\frac{1}{16}$ of a grain of strychnia twice daily, gradually carried up to the tenth of a grain, at the same time giving the compound pill of aloes,

asafoetida, and myrrh. In this case a perfect immunity from attack commenced with the treatment, and has continued up to the present day. The menstrual irregularity gradually righted itself under the influence of the treatment and the tonic use of cold sitz-bath and affusion to the spine, coupled with active friction. This case, though not severe as regards the Epilepsy, is typical of a very prevalent form of the disorder, and shows how readily they yield to a judicious plan of treatment.

A fair, strumous-looking girl, aged 14, with partial paralysis of the left side, at two years old suffered from an attack of meningitis, during the course of which she was insensible for a considerable length of time, recovered, but had a return about two years ago. Since the first attack she has been subject to continued attacks of *petit mal*, sometimes five or six in the day; she turns to the right, is slightly convulsed, but at times retains partial consciousness during the seizure and tries to talk; sometimes she bites her tongue; her manner is silly, being fond of repeating nursery rhymes or lines of childish verses, for which her memory is good. She has slight tenderness on pressure over the region of the upper cervical vertebrae, and on percussing these with the finger points, she complains of pain at the epigastrium. The attacks sometimes come on during sleep. I give here an extract from the diary kept by her parents. The patient came under my care in

May 1867, when I prescribed for her: ℞ Tinct. Nucis Vomicae ʒiij., Syr. Aurantii ʒj., Aquam destill. ad ʒiv., M. cpt. ʒj. bis in die ex aqua.

The following is the diary from May 29th, to the date at which cessation of the attacks occurred:—

May 29th.—Four fits in the day; two at night.

30th.—No fits in the day, but eight in the night, two of them being severe.

31st.—One fit in the morning; eight again at night, but of less severe nature.

June 1st.—No fit in the day; four at night.

2nd.—No fit in the day; five at night.

3rd.—No fit in the day; four at night.

4th.—No fit in the day; three at night.

5th.—No fit in the day; three slight attacks in the night.

6th.—No fit in the day; and if any at night very slight.

7th.—No fit in the day; only one observed in the night.

8th.—No fit day or night.

9th.—No fit day or night.

And so on. Since this date she has continued almost entirely free from attack, but few having occurred, and those of a much slighter character, which yield readily to a slightly-increased dose of the remedy.

The following, which came under my care in June, 1867, was one of the most severe cases of violently convulsive Epilepsy I have ever seen; it is worth

quoting as showing the inhibitory action of large doses of strychnia, and proving the impunity with which they may be given.

To illustrate this more effectually, I have drawn up two tables: the first showing the number of attacks during May, when the patient was under no treatment of any kind; the second giving the number during July, when he was taking strychnia in the doses appended to the table. I may add, that he ultimately recovered completely. The seizures, which occurred almost exclusively at night, were most violently convulsive; they were much influenced by atmospheric changes, heavy thundery weather invariably increasing their number and severity; thus July would, under ordinary circumstances, be a most unfavourable month. In addition to the strychnia, he was, during part of the month, using cold affusion to the nape, and ice in a Chapman's bag to the head.

May 1	...	...	2 fits.	May 17	...	...	1 fit.
„ 2	...	...	1 „	„ 18	...	...	0 „
„ 3	...	...	2 „	„ 19	...	...	0 „
„ 4	...	...	3 „	„ 20	...	...	0 „
„ 5	...	...	2 „	„ 21	...	...	1 „
„ 6	...	...	3 „	„ 22	...	...	0 „
„ 7	...	...	2 „	„ 23	...	...	2 „
„ 8	...	...	2 „	„ 24	...	...	2 „
„ 9	...	...	1 „	„ 25	...	...	3 „
„ 10	...	...	0 „	„ 26	...	...	2 „
„ 11	...	...	2 „	„ 27	...	...	2 „
„ 12	...	...	2 „	„ 28	...	...	1 „
„ 13	...	...	4 „	„ 29	...	...	2 „
„ 14	...	...	3 „	„ 30	...	...	0 „
„ 15	...	...	3 „	„ 31	...	...	0 „
„ 16	...	...	3 „				

UNDER STRYCHNIA.

Fits.			Fits.		
July 1	...	0 $\frac{1}{3}$ gr.	July 16	...	3
„ 2	...	1 very slight.	„ 17	...	0 $\frac{1}{3}$ gr.
„ 3	...	1 { very slight, no convulsion.	„ 18	...	0
„ 4	...	0	„ 19	...	0
„ 5	...	0	„ 20	...	0
„ 6	...	0	„ 21	...	0
„ 7	...	1	„ 22	...	0
„ 8	...	2	„ 23	...	0
„ 9	...	0 $\frac{1}{3}$ gr.	„ 24	...	0
„ 10	...	0	„ 25	...	0
„ 11	...	0	„ 26	...	0
„ 12	...	0	„ 27	...	1
„ 13	...	0	„ 28	...	1
„ 14	...	1 $\frac{1}{12}$ gr.	„ 29	...	0
„ 15	...	0	„ 30	...	0
			„ 31	...	0

On July 14th, owing to a misunderstanding, he had only $\frac{1}{12}$ th of a grain instead of $\frac{1}{6}$ th; it will be seen that four fits followed in rapid succession. I think this table proves conclusively that strychnia in large doses exercises a marked inhibitory power over the disease. It is also worthy of notice that, notwithstanding the diminished number of seizures, those which did occur were of a markedly diminished intensity. The following table gives somewhat similar statistics of the same case for the same period:—

MAY.		JULY.	
No. of attacks.	Nights free.	No. of attacks.	Nights free.
51.	7.	11	23

It will be observed that during the latter half of the month, the dose of strychnia given was as high

as $\frac{1}{5}$ th of a grain, twice daily, and this without the slightest sign of any toxic action of the drug. Since that date, however, a more extended observation of the action of remedies in Epilepsy, especially of nuxvomica, has led me to form a decided opinion that in the large majority of cases of this disease, full doses are not only injudicious but in many cases positively harmful. The object should be to nourish, not to tone, still less to stimulate, the nervous system; and the lower and more depressed the condition of the nervous constitution, the greater will be the irritability of the brain, and the more necessary the observance of the nutrient, in contradistinction to the tonic, method of treatment.

It is common to find that the tendency to disease, although it may yield for a greater or less period to the plan of treatment I have proposed, often shows itself again if the patient be submitted to lowering or exhausting causes; thus a patient, apparently completely recovered, on the occurrence of a lengthened or depressing illness, may exhibit all the former symptoms. In the following cases, examples of this recurrent form of the malady will be found. A lad of 18, who had been under my care at the age of 12, for convulsive seizures, from which he had apparently completely recovered, was seized with a violent attack of measles; this was ushered in by a paroxysm of Epilepsy, which was repeated during his convalescence, and threatened at one time to revert into

the old epileptic habit. A steady persistence in the old plan of treatment, by cold and the continued use of nervine tonics in small doses, ultimately restored him to health, and he has now continued well for some years. A similar history applies to a young lad who, cured of *petit mal* at 7 years of age, was after some years subjected to depressing influences, from extremely rapid growth, coupled with the occurrence of fever, in consequence of which he developed Epilepsy of a hysteroid nature, which only yielded after two years' treatment. A youth of the age of 16, whose father had been a dipsomaniac, suffered from the age of 10, from frequent attacks of *petit mal*, which afterwards took a convulsive form. Having always been extremely wanting in nervous stability, as a child, his mental power gradually deteriorated, so that it became almost impossible to teach him anything. Being placed under minute doses of strychnia, which were after a time gradually increased, together with a tonic course of cold water, he gradually developed increased nervous control, and has now been free from any form of seizure for many years. In addition to this, his mental capacity has developed in a corresponding ratio. His sister, who showed a similar defect of nervous development, was liable to violent and causeless outbursts of passion, and a condition amounting at times to hysteroid Epilepsy, was entirely cured by a similar plan of treatment.

In many cases, Epilepsy is found to supervene on the cessation of some periodical flux, such as loss of blood by epistaxis or hæmorrhoids, or on the drying up of eczema, or some other form of skin disease. In such cases it is always wise to endeavour to supply a safety valve such as a seton, or some other form of counter-irritant, to take vicariously the place of the arrested discharge. If this be done it will then be found safe to build up the nervous constitution and thus to arrest the nervous phenomena. In cases of Epilepsy, which owe their origin to this arrest of a probably necessary discharge, it will invariably be found that the accession of attacks is preceded by a marked increase in the heat of the head. I have so many cases in which the use of the seton, or some other form of active counter-irritation, has been accompanied by a marked improvement, that I am strongly disposed to recommend them in intractable cases. There are several symptoms, an observation of which will usually assist in forming an opinion as to the advisability of the adoption of such a course. I could quote many cases, in which this system of relief to the congested state of the nervous centres has proved efficacious, when the more purely medicinal plans of treatment had failed; and it is a course which I should always feel inclined to adopt before condemning a case as hopeless. The cessation of irritating causes is often sufficient in itself to re-establish the normal equilibrium of

the nervous system, and produce a spontaneous cure. Thus there are many cases of Epilepsy which abate at the cessation of the menstrual discharge, more especially when this periodical flow has been attended by pain and difficulty. A most interesting case, which well illustrates this, has lately occurred in my practice. A lady, aged 48, has been the subject of Epilepsy since 10 years of age. The attacks, which were evidently connected with the irritation produced by difficult menstruation, occurred very frequently, often, indeed, almost every day; they were usually convulsive, and often accompanied by violent hysterical paroxysms of laughing and crying; they were more intense and frequent at the time of the menstrual flow. These attacks had been treated for many years with bromides in different forms and varying degrees, with the result of somewhat lessening their number and severity; but this result had been obtained only by an almost complete mental prostration: the intellect being dulled, and the memory most defective, indeed her general aspect testified to the prostrating nature of the treatment. This patient came under my care in 1884. My first step was to reduce, as far and as rapidly as possible, the amount of bromide; this plan was followed by a marked improvement in the general health; an increased vigour both of mind and body. While gaining these results I noticed that the cessation of the periodical flow (which was at

this time commencing) was invariably attended by a corresponding intermission of the attacks. I therefore persevered in my plan of withdrawing the bromides, and commenced the substitution of minute doses of nerve tonic. The period at times returned, and each return was marked by a renewal of the epileptic paroxysms. I feel confident that so soon as the changed conditions of life are permanently established that the Epilepsy will entirely abate. No doubt in this case the change of life was the main agent in producing this happy result, but it was certainly much assisted by the nerve tonic plan of treatment.

A delicate-looking boy of 14, the son of neurotic parents, had been epileptic for five years, the attacks occurring at intervals of about one month. These were usually of a highly convulsive nature, though slighter seizures at times occurred. Though otherwise enjoying very good health, yet the occurrence of slightly lowering causes, such as over-fatigue or the exposure to heated rooms, and any unusual excitement, were sufficient to induce a recurrence of attack. This boy has now been under my care for nearly three years, and the attacks have, by a perseverance with the tonic principles of treatment, entirely subsided; indeed, he has gone through the exceptionally sultry season of this summer (1887) without any sign of relapse. He has been under my immediate care in a school at Malvern. Though

still carrying out the measures calculated to strengthen his nervous system, yet I have no fear of any relapse.

A lady, aged 34, had been epileptic for 18 years. The attacks, which were commonly more frequent and violent at the menstrual period, were strongly convulsive: there was strong evidence of neurotic weakness on the mother's and, to some extent, on the father's side also. The use of minute doses of nux vomica, and cold tonic bathing, coupled with careful dieting and rest at the time of the menstrual flow, have produced a complete cure; and the manifest change in the condition of the general health makes it plain that the altered conditions of life are likely to be permanent. In a case in which slight epileptiform attacks followed the exhaustion produced by old standing albuminuria, and where the momentary loss of consciousness was preceded by a sharp pain passing through the whole brain, I found that the minute doses of nux vomica, doses indeed so small as the 50th part of a grain, gave complete relief from the distressing feelings; and this fact points clearly to the purely nervous character of the phenomena.

The following case shows satisfactorily the readiness with which children respond to a tonic plan of treatment: A child aged four and a-half was brought to me in 1885. He had been for some time since 1884 subject to severe and prolonged attacks of *petit mal*; these came on generally at night, and were attended

by extreme prostration and coldness: his pulse became almost imperceptible, and the extremities cold and lifeless. The attacks commenced generally with a start, and during their continuance the child would groan and make a chewing movement with the mouth. The family history affords evidence of neurosis showing itself in various ways, but largely in the direction of hysteria; the grandfather, however, had distinct epileptiform attacks at or about the age of 30. At times there was intense congestion and irritation of the sexual organs, pointing to a corresponding irritation of the medulla oblongata. The child had been taken to London and had been seen by several medical men, who had usually advised bromides. Under that system of treatment the child became distinctly worse, the attacks more frequent, and of greater intensity; and there was a marked deterioration in his general health. On seeing the child I at once discontinued the bromide, and replaced it by very small doses of *nux vomica*, at the same time ordering a tonic course of cold bathing and a very nourishing diet. The change which occurred was marvellous, both in its rapidity and completeness; the attacks yielded almost from the first, and are now completely suspended; the improvement in the child's general health is also most marked. Since then I have substituted *avena* for the *nux vomica*, and the child continues strong and well.

A child of 12 was cured by me of convulsive attacks of Epilepsy in 1881. Early this year the mother brought her to me again, as in consequence of over-study (she being very anxious to obtain the post of school teacher) she had shown a tendency to relapse ; so far, however, the symptoms had been confined to sleeplessness, headache, and an inability to remember her work. I at once advised her to give up her brain work, and to recommence the small doses of *nux vomica*, and this plan has been followed by a complete removal of the distressing symptoms.

In children, for reasons which I have already stated, this nourishing of the brain is almost invariably successful, and provided that no structural change of that organ, either congenital or such as is produced by the violence of attack, exists, a favourable prognosis may very justifiably be given ; but, while saying this, it is to be remembered that the system must be carried out in its entirety. For this reason I much prefer to have my patients under my immediate care and supervision, so that no part of the treatment should be in any way neglected.

No object would be served by extending the number or detail of these cases. I hope that I have said sufficient in the earlier chapters of this little work to prove my point theoretically ; I feel confident that the results of my practice will speak for themselves. In contrasting the two schemes of

treatment, we see on the one side a system which commends itself as being in strict accordance with the views of the etiology of the disease, as laid down by a large majority of the best informed writers—a system which has for its object the permanent restoration of the lowered nervous vitality, which is the main cause of the disorder. On the other hand, we find a scheme of treatment which is admitted by almost all observers to be merely palliative, which produces its immediate, though transitory, results by numbing the hyper-sensitive brain—not strengthening it—which ultimately lowers, instead of restoring the nervous energy, and consequently fails, and must always fail, to supply—which is most required in these cases—a firm and stable power of control.



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